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LOOKING AHEAD

WITH THE EDITOR

Effect of Water-Drive on Prorated Field Must Be Determined in Appraising Field Properties

IF an oil field is subjected to proration and active water-drive such as the East Texas and Hastings fields, it is generally assumed that the producing life expectancy and the ultimate recovery of wells drilled up-structure will be greater than the average for the field. But how much greater? For instance, how much oil will a 40-acre lease located in the Hastings field actually produce when all geological and production facts are known?

In order to determine the ultimate recovery of a well or a lease it becomes essential not only to establish the general relationship of withdrawal of oil to drainage sustained through water encroachment for the field as a whole, but also to determine the relationship of depletion of individual wells and leases in terms of drainage sustained by these leases through the withdrawal of oil by other wells.

When the problem is transposed to a field such as Hastings or East Texas it becomes more complicated. In the first place, the water data is not always available or satisfactory. In the second place, just where is one to draw the limit of well interference? Nevertheless, an appraiser is faced with these and similar actual problems.

How one appraiser tackles the problem is to be the subject of an article being prepared for publication in an early issue of THE OIL WEEKLY.

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THE OIL WEEKLY

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The Oil Man's Calendar

MAR. 19	American Petroleum Institute, Pacific Coast District, Division of Production, Los Angeles.
28–29	American Petroleum Institute, Southwestern District, Division of Production, Houston, Texas.
–31	Western Petroleum Refiners Association, Wichita, Kansas.
APR. 9–11	Society of Exploration Geophysicists, Chicago.
10–12	American Association of Petroleum Geologists, Chicago.
11	Society of Economic Paleontologists and Mineralogists, Chicago.
	Petroleum Fluid Metering Conference, Petroleum Division, A.S.M.E., Norman, Okla.
11–12	American Petroleum Institute, Eastern District, Division of Production, Columbus, Ohio.
16–18	Southwestern Gas Measurement Short Course, Norman, Okla.
18–19	National Petroleum Association, Semi-Annual Meeting, Cleveland, Ohio.
26–27	Petroleum & Natural Gas Conference, State College, Pa.
MAY 1– 3	Petroleum Industry Electrical Association, Dallas, Texas.
6–10	American Gas Association, Natural Gas Section, Houston.
15–17	Natural Gasoline Association of America, Tulsa.
18–25	International Petroleum Exposition & Congress, Tulsa.
27–31	American Petroleum Institute, Mid-Year Meeting, Ft. Worth, Texas.
30–31 June 1	National Oil Scouts and Land Man's Association, Hot Springs, Ark.
JUNE 1	Illinois-Indiana Petroleum Association, Robinson, Ill.

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International Number

The OIL WEEKLY in this issue presents to the World-wide Oil Industry its annual **International Survey** of development in the more important countries outside of the U.S.A. together with some predictions as to future trends. More than 30 special articles, listed on the following page, have been prepared to project today's picture of International Oil.

★

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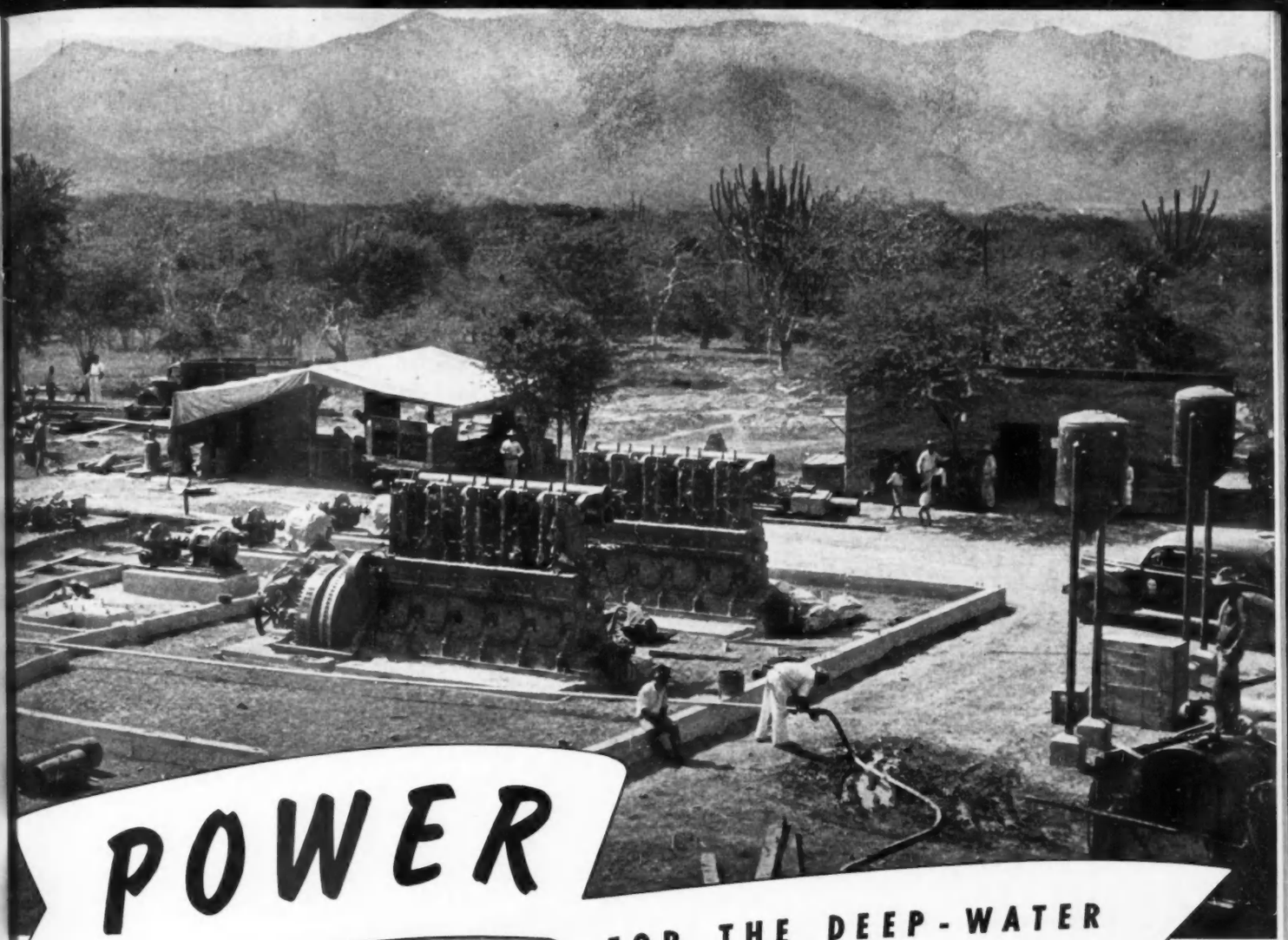

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FOR THE DEEP-WATER TERMINAL at PUERTO LA CRUZ

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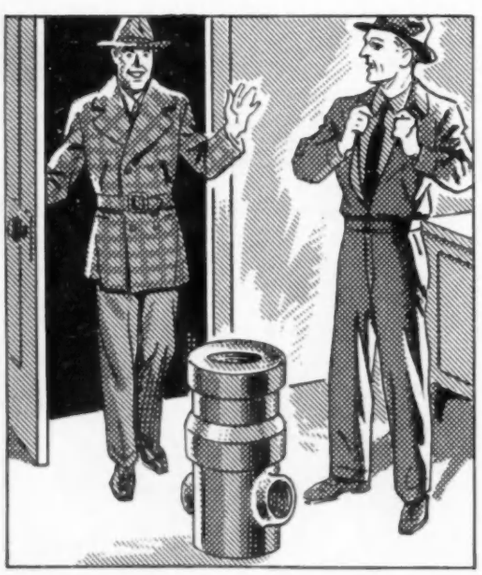

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YOU CAN CHANGE the rubbers and slips 2" or 2½" tubing . . . and 5½" OD parts ar changeable with 7" OD. You can get part Larkin to make up a high or low pressure mandrel type head; or a flanged-type slip or m head for high or low pressure work.

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THE OIL WEEKLY

MARCH 18, 1940

VOLUME 97 NUMBER 2

World Panorama

INTERNATIONAL OIL, viewed through the lenses of today's political trends, is smudged with the embryo image of a great industry crippled by tendencies which threaten to subvert sound operating technology for the fallacy of nationalization.

Nationalization has a strong foothold in some countries. Government sanction is necessary before industrial policies can be determined — or discontinued. If this spreads, its significance is obvious.

So far as oil is concerned, government red-tape-delay in application of technique which permits immediate utilization of the full mechanical and natural forces available in recovering the most possible oil from a field is synonymous with useless waste of a national resource. Oil, if it is to give the peoples of the world the most for their money, cannot wait for a committee or a senate to determine when to bean a well back, when to plunge millions into a project, or when to retain or change administrative personnel. But today oil pathetically must try to do some of these things under government control in certain countries, and the people are paying the price for the folly of such policy.

Ramifications of oil commerce are so far reaching that paralysis through political trends in one part of the world works a hardship on the industry and people in another.

World oil faces a serious educational duty in 1940.

Today's nationalistic tendencies point to lower-paid workers throughout the world; but the workers do not seem to see it—except possibly in Mexico and Bolivia. They point to a situation which kills that individual initiative so essential in a competent technologist. But the nationalized industries do not seem to realize this—except Russia, which is continually clamoring for foreign engineers.

Unless the trend is changed, there looms for the oil industry the day when it must be reticent to invest a single cent in any totalitarian state; there looms for those states the time when they will not be able to obtain a single cent for development of national resources except by taxation. And if revenue-producing industry is killed by politics, from whence will come the taxes?

Every function of the oil industry is international in scope. Its operating technique, its equipment, its personnel, its language, its literature, its product utilization, all find universal application. Oil's influence on civilized progress is unlimited. Only shortsighted politics can restrict its sphere of accomplishment.

ECONOMIC SHADOWS BRIGHT SPOTS IN

By WM. V. GROSS, Foreign Editor

IN presenting a forecast of drilling and exploration activities outside the United States of America in 1940, it is necessary first to touch briefly on world production and consumption in 1939 and indicated production and consumption for 1940 to establish a motive for anticipating an increase or a decline.

There has always been a definite relationship between the rate of flow of general traffic over international commerce lanes and the movement and salability of petroleum—or the incentive to drill, if one goes a step farther. As a rule, when trade between nations is good, inducements offered the wildcatter and field developer are more attractive. By the same token, severance of cordial relations between thickly populated, important petroleum-consuming nations at first glance would seem to clot the arteries of traffic and reduce the incentive to drill. But inevitably there have ben compensating factors in some parts of the world to help offset the detrimental effects growing out of the rupture of traffic movement in other parts. Like a see-saw, when European receipts of oil from one source go down, those from another source normally go up; if Benjamin gets leery of trying to ship oil to Karl, human nature and the desire for profit are such that it will be only a matter of time until either Henry or John takes a shot at it—war or no war. And speaking of war, it should be pointed out that the following observations on the outlook for exploration and drilling in 1940, which in general reflect an upward trend, are predicated on the assumption of continuance of war throughout the heavy-demand months of 1940 and a normal growth in ordinary peace-time requirements.

Figuring world production at 2,079,000,000 barrels in 1939, which was an increase of about 100 million barrels over the amount produced in 1938, there are several reasons to anticipate an increase for production in 1940, notwithstanding it has been estimated that world consumption of petroleum for civil purposes in 1939 was some 55 million barrels below the above production figure. United States of America consumed 96 percent of the 1939 increase in output with normal peace-time requirements, and there is nothing on the immediate social, political, or economic horizon of that country to herald an early paralysis in the natural growth of petroleum product needs.

Looking at the consumption figures of the world outside of U. S. A., one sees that even peace-time requirements of those countries grew 14,000,000 barrels in 1939, notwithstanding the fact that the United Kingdom, France and Germany cut their civil requirements by 7,400,000 barrels in anticipation of increased needs for military purposes in the spring—which is practically here. That cut only will be of temporary aid if hostilities along the Western Front are opened in full blast by April. The storage capacity in the immediate war zone is simply not great enough to have allowed accumulation of reserve stocks ample for a prolonged battle of great intensity. Greater Germany wound up the year with a shortage of 34,000,000 barrels in the matter of meeting civil needs alone. Siegfried line fighting on a scale comparable to that of the first World War would increase the country's consumption from the figure of 54,000,000 used by V. R. Garfias for civil needs in 1939 to at least 100,000,000 barrels.

Hence, we see that the indicated

ARABIA The above tank construction, in part, answers the question: "What's happening in Saudi Arabia"?

HAVE NOT OBSCURED INTERNATIONAL OIL

points of concentrated consumption for 1940 furnish a definite, widespread incentive to exploration and exploitation drilling. And the picture is such that one may see where some of the increased activity will take place.

Persian Gulf Important

Although other sections of the world will complete more wells during 1940, because of its potential importance as a factor in the future international oil market, prime importance should be attached to Saudi Arabia, or the western shore of the Persian Gulf. Relatively shallow flowing production thus far obtained at Damman, or Dharan, Burghan, Bahrein, and possibly by this writing on at least one other structure in that region, represents a sufficiently tantalizing bait to assure continuance of field and wildcat drilling during 1940 and to predict an increase in completions for the region over 1939.

Next should be considered those two widely separated nations that are vying for second rank among the world's producers, viz: Russia and Venezuela, for they illustrate the functioning of the compensating factor in world-wide drilling and exploration.

JAPAN Drilling in the Shukkoko field above has put Japan in the class of deep drilling countries.

Local and market conditions seem to point to fewer completions in Venezuela during 1940 than the 415 during 1939, even though certain spots in Eastern Venezuela will drive hard to reach a potential production figure sufficient to utilize capacity of the recently completed 100-mile, 16-inch line from Oficina field to Guanta, tidewater terminal. Production quotas of the major operators in Venezuela are said to call for substantially less oil in 1940 than the 207 million barrels produced last year. But while drilling on the whole will decrease, there is indication that wildcatting will continue at a lively clip, with possibly more exploratory tests being drilled in 1940 than in 1939, during which the major development was the El Roble strike.

Russian Increase Seen

The contemplated emergency demand being what it is, the outlook for Russia for 1940 embraces increased drilling. The Soviet quota calls for runs in excess of the 212 million barrels (exclusive of Sakhalin) recovered in 1939, and with the duration of increased military demands uncertain, to say the least, last year's discoveries in the Apsheron Peninsula, particularly in the western and previously condemned portion, will be developed as rapidly as possible. Unfortunately, field and wildcat completion data on Russia are not available, but if Venezuela felt called upon to complete 415 wells in 1939 and 521 in 1938 to maintain a production rate slightly under that of Russia, it is reasonable to expect that Russia will complete over 600 wells, conservatively speaking, in 1940—provided the country is not crippled by military antagonists or drain on personnel. There is a specific technical reason for the necessity of more Russian than Venezuelan completions to maintain a given rate of production. The Russians can drill the wells and they can flow them, but when it comes to the technique involved in artificial lifting of oil, they simply do not stack up with petroleum engineers in some other countries, including

BRAZIL Modern equipment used on this rig assures a thorough prospecting of two large coastal areas.

Venezuela. Added to this, Basil B. Zavoico of Chase National Bank, New York, prophesied in February before the American Institute of Mining and Metallurgical Engineers that Russian production in 1940 might soar to 650,000 or 700,000 barrels per day. The smaller figure would shoot Russian production up to 237,250,000 barrels this year, so the probable effect on drilling would be obvious.

And Russia has a host of prospects yet to be drilled, to say nothing of the discovery in the Crimea and the first commercial production in the salt dome basin of the Ukraine, both 1939 events. The 3000-mile long Ural basin, official Moscow says, also was brought to the fore with many important geological discoveries, including observation of an almost unbelievable number of seepages.

East Indies Busy

Netherlands East Indies promises to be another bright spot during 1940 so far as field and wildcat drilling are concerned. From a standpoint of participation in world markets the area may be compared roughly in importance to the upper half of the Texas Gulf Coast. The head of mine inspection at Bandoeng writes that 1939 production was 7,943,230.4 metric tons against 7,397,773.9 tons for 1938. Attempts will be made to maintain this upward trend for the call on this part of the world for production has grown, especially since the wars in the Far East and in Europe.

Competitive efforts for concessions in the East Indies continues, with several of the largest oil companies in the world standing in the waiting line for new grants. Meanwhile preliminary geophysical and geological work, including core drilling, is in progress on millions of acres already held by these organizations. Vast areas yet undrilled must be drilled or the concessions surrendered back to the governments.

New Guinea and Northeast Borneo will be prominent in the wildcatting limelight during 1940, but Sumatra probably will be in the van of the completion column. Netherlands New Guinea Petroleum Company is said to have found a new field in New Guinea, but data on the strike was not available for this issue.

Growing importance of Limau, South Sumatra, was attested by construction during the year of a 56-mile, 8-inch line (Praboemoelih to Pladjoe) to take care of its production. Borneo, Sumatra, Java and Ceram probably will keep on the average of at least 65 rigs running the first half of 1940.

Argentina and Colombia

Argentina recorded a development during the year which is likely to be of importance from an exploratory drilling standpoint at a relatively early date and possibly will someday result in considerable exploitation work. It was the substantiation of the strike at Tupungato and the attendant revelation of possible potentialities of a large structure running hundreds of miles north and south in the western part of that republic, a structure which may someday yield a whole string of fields along its axis.

Government authorities predict a continuation in 1940 of the upward production trend in evidence for the past three years in Argentina. If this prediction is converted to reality, it would seem that an increase in drilling would be called for unless 1940 completions have

considerably higher initials than those in 1939. Finished wells totaled only 292 last year against 343 in 1938, establishing a trend which will have to be reversed to meet the increased production quota.

EAST INDIES Jungle and swamp do not hinder plans for increased drilling and prospecting in Sumatra.

Colombia figured prominently in 1939 oil news because Barco concession oil found its way to tidewater through completion of the second major crude carried in the country. And now work has been started on a wildcat campaign on Monte Oscuro anticline which may throw the spotlight on the Magdalena Valley again. Commercial development of an oil show found at 2500 feet would start drilling on three separately owned concessions in which the anticline lies. However, several are watching developments in Colombia closely who would be surprised at any appreciable increase in 1940 over the 145 completions, exclusive of wildcats, recorded in 1939.

Trinidad, possibly one of the most closely observed areas of petroleum development for more than a decade because of its influence on world markets, has fallen under the ban of censorship, but it is generally predicted that that British colony will establish an all-time peak in 1940 and produce well over 20,000,000 barrels. No outstanding wildcat discoveries were reported during 1939, but sufficient locations in proven territory are available to provide a substantial boost in production.

Other America

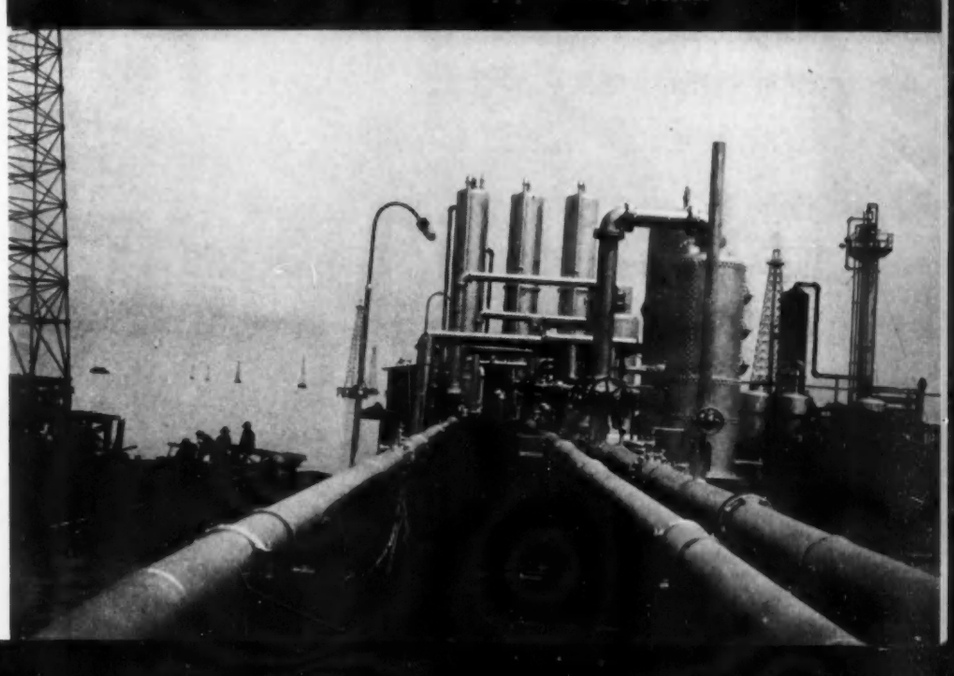
Alaska's activities for 1940 will be restricted continuation of joint exploratory efforts of Standard Oil Company of California, Union Oil Company, and Tide Water Associated Oil Company which so far have not resulted in establishing commercial production. There is a possibility, hinging on the outcome of proposed national legislation, that Iniskin Drilling Company, which feels it has found something worth looking into on Chinitna Peninsula, may be allowed to obtain an extension to its prospecting permit and deepen a wildcat which has logged oil and gas showings.

Canadian production, which established an all-time peak in 1939 under restrictive allowable regulations, will record another increase in 1940, and Turner Valley, which completed 34 wells last year, probably will better that record in 1940, and exploratory work has gained sufficient momentum in other provinces outside of Alberta to render safe a prediction that Canadian wildcatting definitely will swing upward during 1940. New oil production in Saskatchewan and favorable showings on a number of scattered likely structures furnish the bait.

Mexico

Mexico will have to record substantially more than the 24 completions she did in 1939 if promises of President Lazaro Cardenas are fulfilled. He has told the people of Mexico the country soon would be exporting 200,000 barrels daily, against 60,000 barrels daily at the time the foreign-controlled oil properties were expropriated two years ago. This means a considerable speeding up in exploitation drilling, as only 8 rigs were active as the year opened. Ten others, however, were reported idle. In addition the government contemplates purchase of new hole-making equipment, according to Cardenas, and Japanese money has entered the picture.

As to exploratory work, it is known that the little wildcatting effort put forth by Mexico in 1939



VENEZUELA Technological improvements will mark future development of Venezuela's many producing fields.

yielded no results of commercial value. And inasmuch as it is doubtful whether equipment at Poza Rica, the country's richest field, can complete wells fast enough to meet the increased production quota inferred in Cardenas' promised export figure, some wildcatting will have to be done besides currently active wildcatting areas noted only for gas potentialities. But frankly, there is a distinct difference between a drilling budget and a political promise of the National Socialist party in Mexico. Into which category Cardenas' statement falls is anybody's guess. But it seems safe to predict that Mexico could not do much worse than the rather poor record of 24 completions in 1939, and likely, having ironed out a few administrative kinks, probably will improve the showing.

COLOMBIA New importance is attached to Colombia with the completion of the Barco line which met obstacles such as this.

Cuba and Hispaniola

Interesting from a standpoint of possible participation in world petroleum markets of tomorrow are two large islands of the West Indies, Cuba and Hispaniola. Cuba is engaged in the greatest oil exploratory campaign of its history and promises to complete many more wells in 1940 than it ever has in any single year. An almost pure gasoline yield from shallow depths is enough to intrigue the wildcatter, even though the average initial yield is Lilliputian. Deep prospects of the island, as yet investigated in only a few spots, are being looked into by major operators of financial stability.

As for Hispaniola, the Dominican Republic comprising the eastern half thereof went on record during 1939 as a new producing country, and Haiti, the western half, is being searched as this is written. Responsible operators are active in both sections of Hispaniola, so 1940 should contribute substantially to knowledge of the potentialities of the island.

ECUADOR Polish tool-dresser, dressing Galician bit for British owned Anglo-Ecuadorean Oilfields, Ltd., Ancon field.

South America General

While Venezuela, Argentina and Colombia have been touched upon as possible "hot spots" of field and wildcat drilling during 1940, it should not be overlooked that Eastern Peru and Brazil entered the ranks of producers during 1939. Peru's 1940 completions probably will exceed the 88 recorded in 1939. Because of inaccessibility to markets, the strike of Blue Goose Oil Company in Eastern Peru will have no immediate bearing on the country's production figures; but it does open the eyes of others to possibilities east of the Andes and has resulted in applications for exploratory concessions and the perking up of Brazil over chances of oil production along the western frontier to the extent that the latter country has commenced exploratory drilling there.

Brazil

Interviewed by THE OIL WEEKLY February 27, J. E. Brantly, who as head of Drilling & Exploration Company has supervision of the drilling phase of the exploration campaign in Brazil, had the following to say:

"The Brazilian government is very friendly to United States cap-

[*Continued on page 223*]

1940 World Production Likely to Exceed '39 Peak

By L. J. LOGAN, Associate Editor

WORLD production of crude oil likely will reach a new all-time peak in 1940, after having exceeded all previous records in 1939.

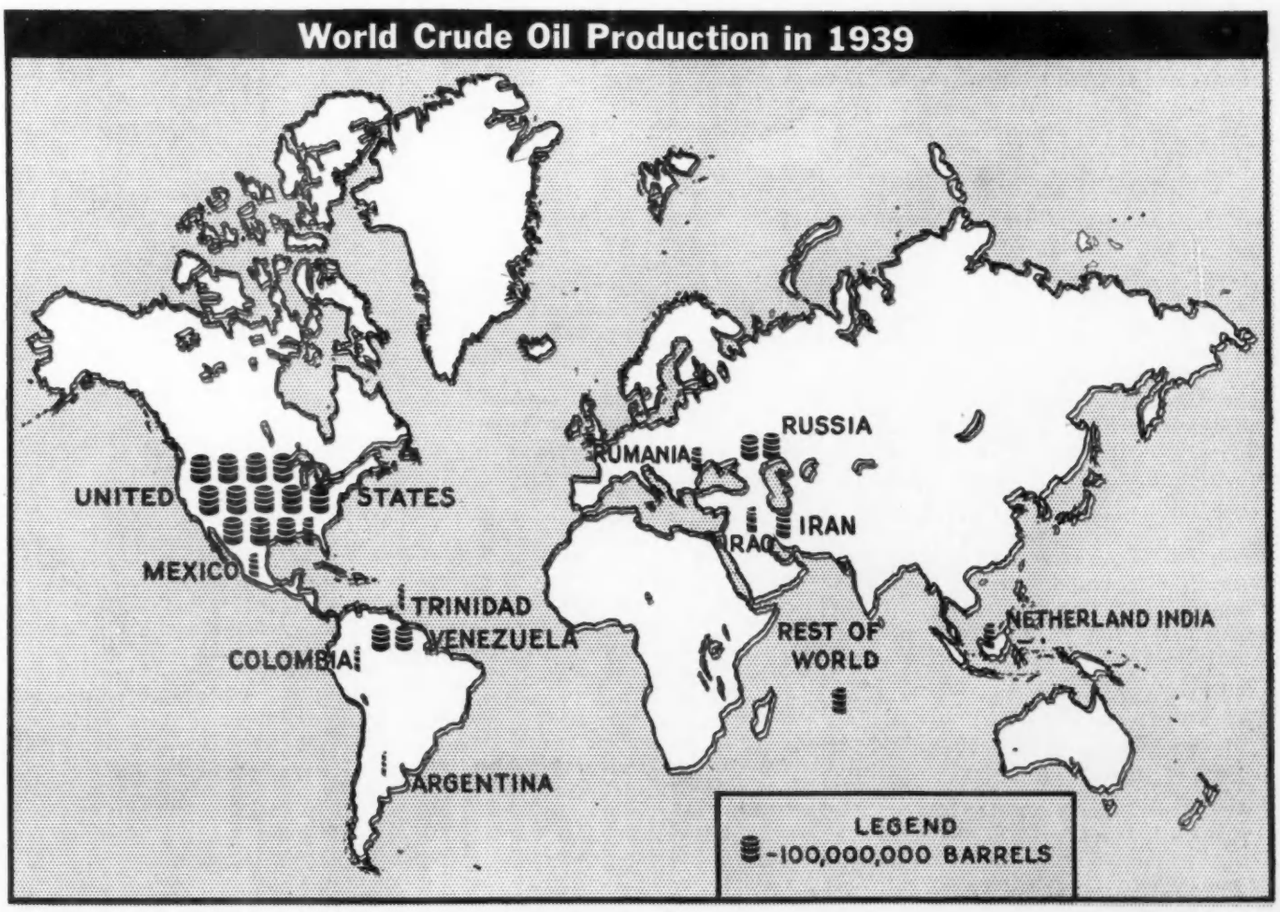
For it is extremely improbable that demand will shrink to such extent as to necessitate cutting back of wells and fields, particularly in view of the fact that production already was restricted enough in 1939 to permit withdrawal of about 43,000,000 barrels of crude and refined oils from storage in the United States. (Such a restriction on crude production would not be feasible in 1940, as crude stocks in the United States are practically as low as operating requirements will permit.)

Thus it would be possible for world consumption to decrease around 40,000,000 barrels from the 1939 proportions without necessitating a cutting back of wells to prevent accumulations in storage in the United States or other producing countries where additions to stocks are not welcomed.

As a matter of fact, it appears likely that instead of any decrease, there will be as large a demand for petroleum in 1940 as in 1939, if not larger.

For an increase of around 5 percent is expected in the United States, and it would require an 8 percent decrease in the rest of the world to cancel such a gain; whereas increases have occurred consistently in the past 7 years, including a 2 percent advance in 1939.

It has been estimated that there was an increase of about 40,000,000 barrels in 1939 in the requirements of foreign countries for military purposes and for building up storage. That amount was approximately the same as the net withdrawal from storage in the United States, and inasmuch as another such withdrawal from United



Rank of Leading Oil Producing Countries Same in 1939 as in 1938 but Materially Different from 10 Years Ago

1929			1938			1939		
Rank and Country	Barrels Production	Percent of World Total	Rank and Country	Barrels Production	Percent of World Total	Rank and Country	Barrels Production	Percent of World Total
1. United States	1,007,323,000	67.8	1. United States	1,214,355,000	61.2	1. United States	1,264,256,000	60.7
2. Venezuela	137,472,000	9.2	2. Russia	202,290,000	10.2	2. Russia	212,975,000	10.1
3. Russia	99,507,000	6.7	3. Venezuela	187,369,000	9.4	3. Venezuela	207,055,000	9.9
4. Mexico	44,688,000	3.0	4. Iran (Persia)	77,230,000	4.0	4. Iran (Persia)	79,815,000	3.8
5. Iran (Persia)	42,145,000	2.8	5. Netherlands India	57,481,000	2.9	5. Netherlands India	61,293,000	3.0
6. Netherlands India	39,279,000	2.6	6. Rumania	48,366,000	2.5	6. Rumania	45,997,000	2.2
7. Rumania	34,758,000	2.3	7. Mexico	34,794,000	1.8	7. Mexico	40,778,000	2.0
8. Colombia	20,385,000	1.4	8. Iraq	32,643,000	1.7	8. Iraq	31,165,000	1.5
9. Peru	13,422,000	0.9	9. Colombia	22,450,000	1.1	9. Colombia	22,001,000	1.1
10. Argentina	9,391,000	0.7	10. Trinidad	17,736,000	0.9	10. Trinidad	19,392,000	0.9
11. India (Brit)	8,747,000	0.6	11. Argentina	16,937,000	0.9	11. Argentina	18,256,000	0.9
12. Trinidad	8,716,000	0.6	12. Peru	15,839,000	0.8	12. Peru	13,677,000	0.8
Others (Chiefly 13 countries)	20,034,000	1.4	Others (Chiefly 19 countries)	51,951,000	2.6	Others (Chiefly 19 countries)	62,823,000	3.1
World Total	1,485,867,000	100.0	World Total	1,979,441,000	100.0	World Total	2,079,493,000	100.0

States stocks would not be practical, the extra military and related demand of 1939 might be eliminated without lowering the demands on the producing wells of the world, provided civilian consumption for the world as a whole were maintained.

And such a maintenance of civilian use appears fairly well assured, as the indicated gain of about 5 percent in the United States, equivalent to more than 60,000,000 barrels, should go a long way toward offsetting any declines in other countries, that might occur because of the wars, which represent the only important threat to the normal rising trend.

New High in 1939

The world production of crude oil in 1939 amounted to approximately 2,079,493,000 barrels, or 5 percent more than the 1,979,441,000 barrels reported for 1938. Output in the United States was up only 4.1 percent, and fell somewhat short of the 1937 production. But production of other countries in the aggregate was up 6.6 percent, to a new high of 815,237,000 barrels.

The United States, too, would have reached a new high if production had equaled current market demand, as output was within 15,000,000 barrels of the 1937 peak, while more than 40,000,000 barrels came from storage instead of the wells to fulfill the demand.

Nevertheless, the sharp gain in other countries pushed the world total of production above the level of 1937, the only other year in history when world output exceeded 2,000,000,000 barrels.

Although the wars have caused restriction of civilian consumption of petroleum in belligerent and some adjoining neutral countries, such curtailment has been at least partially compensated by increased military and storage requirements. Consequently, no serious interruption of the usual upward trend of consumption and production is definitely in prospect. And increased military activity might cause an increase, rather than decrease, in total oil requirements.

Consequently, any forecasts of the probable effect of current wars on crude oil production necessarily would be largely in the nature of guesses, and it appears safest to assume that demand in belligerent countries may be about unchanged or down in 1940 and that the need for crude oil production may be limited to that extent.

Normal Trends Upward

In the absence of wars or serious business depressions, trends have been consistently upward for both demand and production of petroleum, and the upward trends have been more pronounced outside than in the United States.

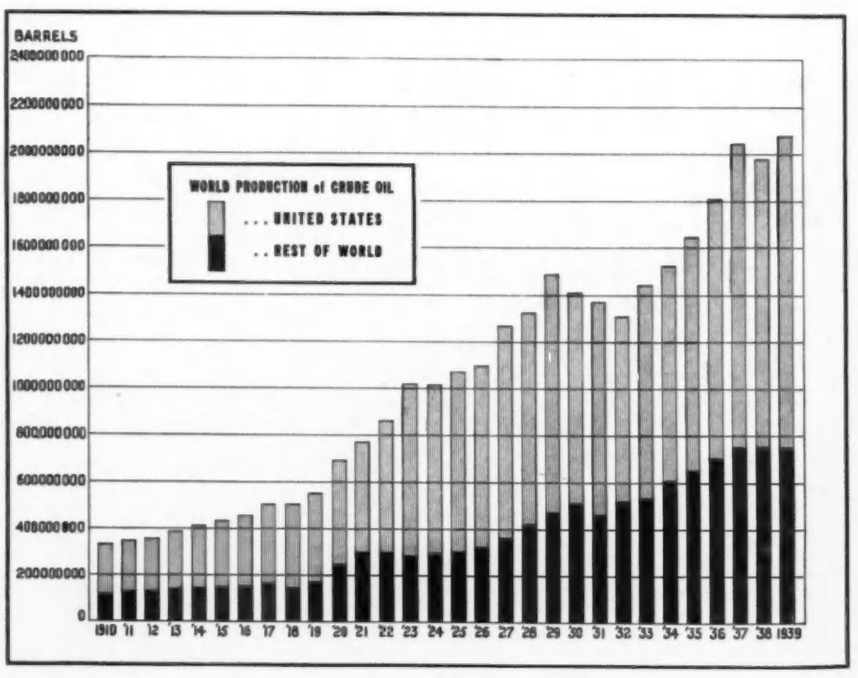
In fact, there was not any interruption of the rising trend of crude production outside the United States in the severe depression years, 1931 and 1932, although production declined in both of those years in the United States.

And foreign production has continued to increase so consistently and so sharply that in 1939 the countries outside the United States produced more oil than the United States did in 1932. The outside production was 815,237,000 barrels in 1939 and the United States produced only 785,159,000 barrels in 1932.

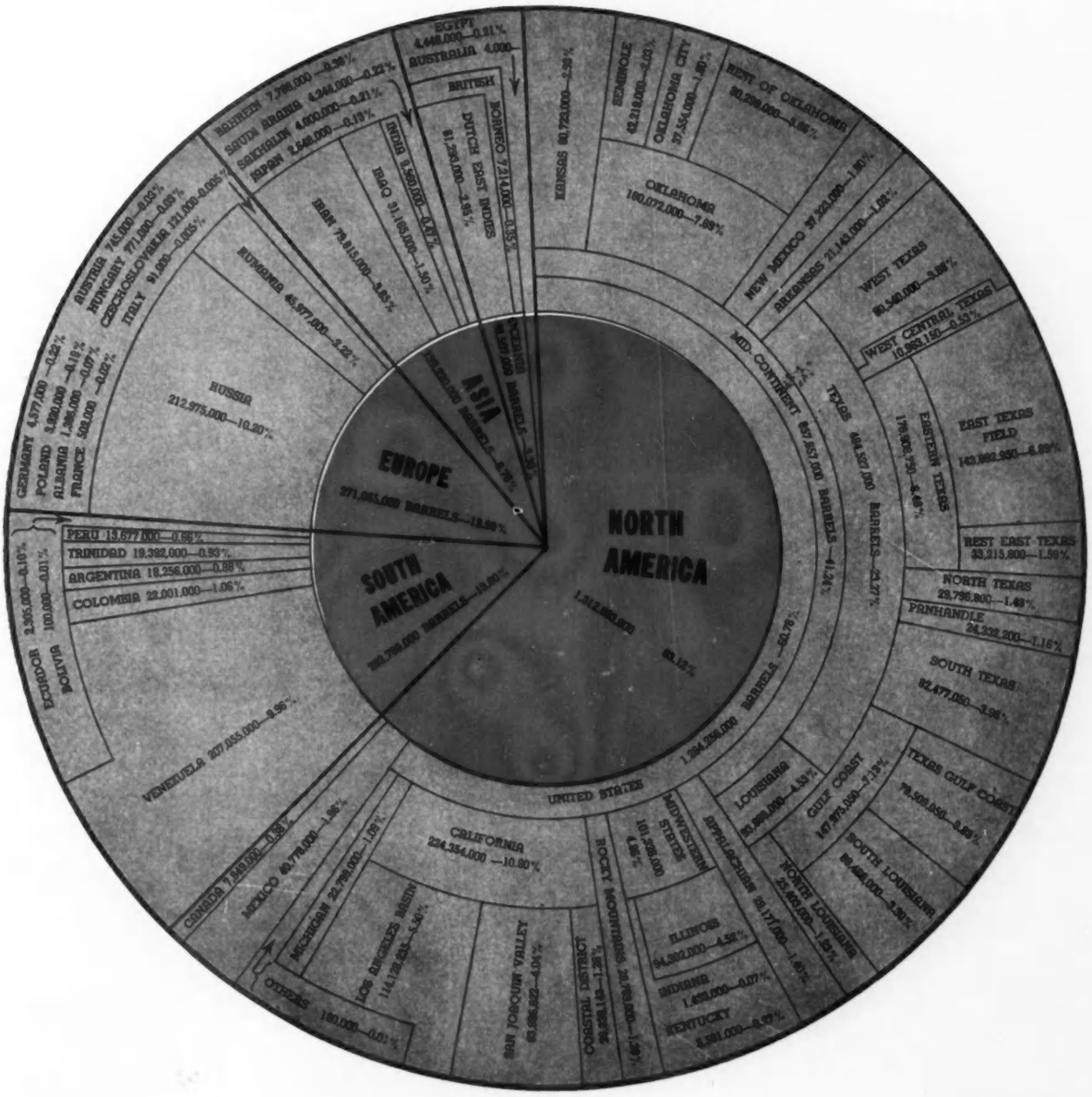
The past seven years have brought an increase of 58 percent in world production, from 1,309,677,000 barrels in 1932 to 2,079,493,000 barrels in 1939.

Having risen from 785,159,000 barrels in 1932 to 1,264,256,000 barrels in 1939, United States production has expanded 61 percent in the past seven years.

Countries outside the United



Distribution of World Production—1939



States have shown a similar increase of 55 percent, as the 815,237,000 barrels produced in 1939 compared with 524,518,000 barrels turned out in 1932.

Aside from the probable substantial increase in the United States, changes in production in 1940 may be determined to a considerable extent by the war situation. Britain, France, Germany, and Russia may be expected to step up production within their boundaries and in their possessions, in so far as necessary and possible.

Venezuelan production will be stimulated by the agreement which authorizes the lower import tax on shipments into the United States. Output in Colombia will be boosted through the recently completed pipe line. The governments of Argentina and Bolivia will try to develop more production, as will that of Mexico. Peru, Ecuador and Brazil probably will not show material change from 1939. Trinidad has no new fields, but production is expected to increase in response to British war requirements. Canada can produce more and probably will, through development at Turner Valley.

Roumanian output continues to decline, as no important new production has been developed for several years through either discoveries of new fields or extensions of the established fields.

The Near East likely will show further expansion of production. Saudi Arabia is a particularly promising area. Iraq and Iran have controlled production, and will meet whatever requirements are made of them.

The Far East, as well as the Near East, may be expected to feel the influence of the European war, and it is questionable whether or not production will be increased materially further, following considerable expansion in 1939.

Detailed World Production Figures By Countries, By Years, Will Be Found on Pages 218-219.

Expansion of world refining facilities is reflected in the latest type processes used by Ancap in its cracking plant at Montevideo, Uruguay.

Unsettled Conditions

Rush World Refinery Modernization

By GEORGE REID

WORLD refining capacity totals 7,500,000 barrels a day, of which about 4,500,000 barrels is located in the United States. Out of 3,000,000 barrels capacity outside of the United States the countries of Europe have an aggregate refining capacity totaling approximately 1,500,000 barrels daily, South America about 750,000 barrels daily, with the remainder in Africa, Asia, Canada and Mexico.

European countries, nationalistic for the most part in policy and politics, have built up petroleum refining industries within the past few years and the majority of their installations are of the most modern and efficient types. However, with the possible exception of France, none of them has sufficient refining capacity to meet normal peace-time needs for oil products. None of them has crude oil production within the country's boundaries to operate their plants save Rumania, where there is more refining capacity than crude production, and Russia, where refining capacity could, under pressure, probably process the nation's available oil production. Some of these countries, notably Germany, and to a lesser degree, England, France and Italy, have attempted, chiefly through direct subsidy, to create industries which would bolster up motor fuel production by means of synthetic processes working on coal and lignite, and through the utilization of alcohol.

Construction Trend

The general trend in refinery construction abroad, with a few major exceptions as will be noted later, is not so much in the establishment of new refineries as it is in the extension of existing facilities, using means such as the modern catalytic processes, and processes with improved thermal technique, adapted especially to the production of high octane aviation motor fuels. This trend has been particularly noticeable in most of Europe, the Near East, and in the East and West Indies. Coincident with this general improvement in processing facilities there have been some increases in crude oil charging capacity, and for the most part these installations have been of the type designed for improved performance in production of aviation fuels. Likewise, facilities have been improved for production of lubricating oils, diesel fuels, and for increased production of residual fuels. However, and although the recent period of activity and the present volume of work have been impressive the foreign nations have not added sufficiently to over-all capacity to reduce materially importation of finished refined products for long.

Over-all, it is estimated that the warring countries and their neutral neighbors who possess refining industries, cannot refine much over 50 to 60 percent of their normal peace time needs. Further, these countries, with the exceptions as previously noted, must import crude with which to operate their refineries. The flow of crude oil from the Americas and the Near East to European countries is continually under threat of disruption either by increased submarine and airplane warfare, or by movement of armies into regions not currently included in the combat areas.

Under these conditions it is only natural that all countries concerned look to the modernization and improvement of existing plants in both hemispheres, and to the installation of some new refineries in isolated regions not likely to become involved in the hazards of belligerent zones.

Plant Extension

Construction of new refining facilities in the larger countries of Europe has been progressing at an accelerated pace during the past two years, especially during 1939, when governments began to anticipate war conditions. England, France, Germany and Italy placed special emphasis upon the installation of modern processes for production of aviation grades of gasoline.

France, with a refining capacity of roundly 150,000 barrels daily in 20 plants, is reputedly able to refine sufficient crude for her peace time needs when operating at full capacity, but this capacity has never been completely used and the country has been an important importer of gasoline, gas oil, lubricants and other products. Recent activity there has involved the installation of two large Houdry catalytic installations designed particularly for production of aviation fuels and two large naphtha reforming plants.

Great Britain, with 18 refineries and a total capacity of 113,000 barrels daily, is, according to most estimates, capable of refining around 40 to 50 percent of her peace-time needs, but must import the remainder of products, and must ship in all of her crude oil from Asia and the Americas.

Some progress has been made in British production of synthetics from coal and shale during recent years but plant facilities are not yet ample, nor sufficiently advanced technically, to consider these processes major threats to crude oil imports.

Britain's most recent refinery

construction consists of completion of a new plant at Manchester for production of transformer and other oils formerly imported from Russia and Germany and the installation of alkylation facilities at Anglo-Iranian plants for production of aviation fuels. Operators in this country have speedily adopted the various catalytic processes especially adaptable to high octane gasoline production and more of these installations are reported now under construction. Strict censorship imposed by European countries because of the war make it impossible to present details of such new construction.

Germany's Position

Although it is somewhat difficult to determine the general position of Germany since the war and since the acquisition of new refining districts, it is thought that around 60 refineries are available now with total capacity of about 68,000 barrels daily. Germany's existing facilities at the beginning of the war were capable of refining from 50 to 60 percent of her annual crude oil requirements. The country, therefore, has been a large importer of both crude oil and refined products. With her trade with the Americas blockaded her imports must come from conquered Polish territory, Rumania and Russia. Little aid can be expected from Italy because of that country's reliance on imports to fill her own needs.

Germany has been bending every effort to establish new facilities for production of good quality aviation fuels for some time. The country has also given much study to production of synthetics from coal and coal tars and to the employment of benzol and alcohol as motor fuels. Total synthetic production in Germany increased from 1,500,000 tons in 1937 to 2,500,000 tons in 1938, the latest figures available. Even though production of synthetics may have increased another million tons in 1939, this total, added to that available from crude oil, is not sufficient even for Germany's peace time needs, which explains her present attitude toward neighboring oil producing countries. The new synthetic plant now under construction in Germany, and scheduled for completion in 1941, will be of some assistance.

However, Germany employs Diesel engines for about 20 percent of her air armada, and her gasoline engines in airplanes can operate on the 80 and 87 octane rating fuels which Germany can make in fairly large quantities with present facilities.

Italy, with 10 refineries having a rated combined capacity of about 41,000 barrels a day, representing a great increase during the past two years, must still import about 45 percent of required finished products. New hydrogenation facilities recently installed for operation on crudes from Albania add to the potential motor fuel supplies to some extent. Italy has been importing crude from America, most of it being shipped from Gulf Coast ports.

Some work in neutral countries in Europe was deferred because of the war. However, the plant under way at Lisbon, Portugal, dependent upon imported crude is being pushed to completion, as is the 6000-barrel plant near Stockholm, Sweden. The latter also will process imported crude.

Building in Near and Far East

Construction of refineries and additions to plants in the Near East and the Far East seemingly indicates a determination to reduce the hazards of processing larger quantities of crude oil in the belligerent zones. At Haifa, Palestine, Consolidated Refineries, Ltd., an Anglo-Iranian-Royal Dutch enterprise, will complete this summer a 40,000-barrel plant to produce aviation and motor gasoline, fuel oil and asphalt from Iraq crude.

Farther East on Bahrein Island, Bahrein Petroleum Company has for the third time increased capacity and has installed various catalytic processes for the production of aviation fuels. In Abadan, Iran, Anglo-Iranian Oil Company has continued to enlarge its mammoth plant there until it has become the largest in the world, the most recent additions, following various catalytic installations last year, include two 20,000-barrel reforming units. The company is preparing plans for another large refinery in the Bandar Mashur area, possibly in conjunction with Gulf Oil Corporation, according to some reports. One report states that this nearby installation may rival in size that of the Abadan plant, which is rated at 280,000 barrels a day.

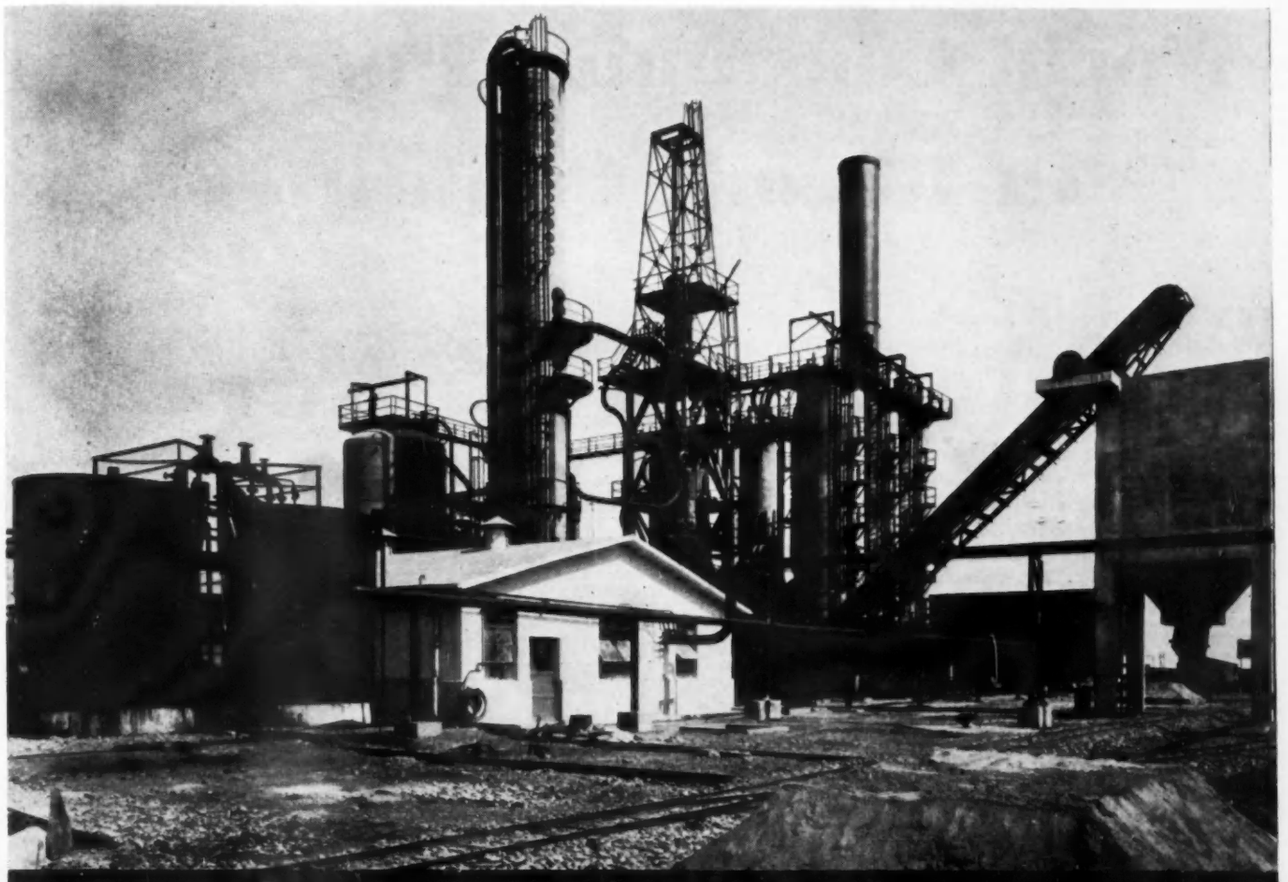
In British India Attock Oil Company has completed a modern 4000-barrel plant which is equipped with cracking and polymerization facilities for turning out high octane fuels. In Netherlands East Indies there have been important improvements made to the refineries of the Shell Union interests, and it is reported that a large modern plant is contemplated in Australia perhaps later this year.

Russia Needs Equipment

Current estimates of the refining industry in Russia credit that country with 19 or 20 refineries having a total capacity of around 650,000 barrels a day. It appears that if the plants were operated steadily, this capacity would be about sufficient to handle current crude oil production. But Russia's principle products are kerosene and fuel oil, and these comprise the largest exported items. The country has restricted facilities for production of high octane rating motor fuel or aviation gasolines. An extensive program of modernization of refining facilities will be necessary before sufficient light products can be produced for export in material quantities. As a hindrance in this direction there is a rapidly growing internal demand for fuel oils of distillate and residual type. Russia, no doubt, will continue to produce sufficient crude for her needs, and she is obligated to share with Germany a portion of this crude.

Rumania, with around 28 refineries having total rated capacity of about 240,000 barrels a day, and with crude oil production totalling but roughly 50,000,000 barrels in 1939, is one European country possessed of refining capacity far in excess of its present crude production. Policy in this country has favored export of finished products rather than crude. A wide range of such products can be produced in the larger and more modern plants, and these are owned mostly by British and American interests. This condition of outside ownership of the most modern facilities for production of premium type products contributes largely to the quandary in which the Rumanians now find themselves.

The advent of spring in this section of the world may well see a military move on the part of the allies which would attempt to stop the flow of Russian oil through Rumania and Poland. Such a move would also attempt to serve as a protective measure against Russian invasion into the oil producing areas now under control of the Allies. Conversion of this part of the world into a battle ground may change entirely the present circula-



Rumanian oil occupies a pivotal position in Europe today but crude production is less than refining capacity.

tion or flow of crude oil both with respect to Germany and the Allies. It is this impending development which makes difficult any attempt to project plans for oil and oil products very far into the future. Some observers express the belief that warfare in the Black Sea area may serve to bring England and France more strongly into the American market for both crude oil and refined products.

South America

The primary activity in refinery extension work in South America has been in the Netherland West Indies, Venezuela and Argentina, with some work reported in certain other countries. The West Indies area has been a rapidly developing center and reports a refining capacity of well above 600,000 barrels a day against crude oil production in adjacent areas of about twice that figure. Next to the United States this center is the most dependable source of supply. Germany formerly depended upon this area for a large portion of her imports. Plants there have been continuously improved and expanded since they were erected several years ago, and their facilities enable production of best fighting grade of aviation gasoline. It is interesting, however, to note that the Netherlands West Indies imported 20 percent of all aviation gasoline exported from the United States in 1939, or a total of 904,435 barrels which, it is believed, may have been either blended and re-exported or transshipped as received.

Venezuela's Capacity Larger

During the past year or so Venezuela has been developing a refining industry and recently added three refineries totaling 55,000 barrels capacity a day. Six plants are reported in this country; three of them very small.

On the island of Trinidad two of the largest refineries have been undergoing extensive improvements to the end that a wider range of products are produced, including aviation gasoline. Present capacity of the seven refineries on Trinidad totals almost 80,000 barrels.

In Argentina the government controlled YPF has enlarged its refineries and added certain catalytic processes.

In Brazil a contract has just been let for construction of a 4000-barrel plant and in Eastern Peru a 1000-barrel refinery is now under construction.

It is not intended that the foregoing discussion present a detailed picture of world refinery construction and operation. Several countries have not been discussed. It is evident from the record as it is correlated here, however, that every effort is being made on the part of virtually all countries with refining industries and on the part of all of the large oil producing and refining companies with world wide holdings, to bring about speedy improvement and modernization of refining facilities to the end that ample supplies of aviation gasoline, motor fuel, lubricants and fuel oils may be available when needed.

World Consuming Petroleum In Record Quantities

WORLD consumption of petroleum followed the normal upward trend in 1939, despite decreases in several of the more important consuming countries, and a new all-time record was established, the 2-billion barrel level having been exceeded for the first time.

The 1939 consumption of about 2,023,883,000 barrels, exclusive of foreign military consumption and additions to foreign stocks, which are not made public, was 5.6 percent greater than that of 1,914,007,000 barrels in 1938. The United States, accounting for 60 percent of world consumption, was responsible for the substantial increase of 1939, as its requirements were up 8 percent, while other countries in the aggregate used only about 2 percent more than in the previous year.

However, the gain outside the United States was general in scope, nearly all countries having become larger users of oil.

More than 50 countries each consume over 1,000,000 barrels of petroleum annually, and in 1939, only 8 of those showed decreases.

Half of the 8 declines occurred, apparently, because of the European war, while the others resulted from other causes. The indicated civilian consumption for 1939 was 2 percent smaller than that in 1938 in the United Kingdom, and other decreases included those of 3 percent in the Irish Free State, 8 percent in France, and 3 percent in Germany.

While figures are not available on military consumption and additions to stocks outside the United States, those two items are approximately indicated by the difference between the known consumption and the world production, plus any withdrawals from storage in the United States or minus any additions to United States storage.

On this basis, V. R. Garfias, in a paper presented before the American Institute of Mining and Metallurgical Engineers, estimated that foreign military consumption and additions to foreign stocks aggregated 203,000,000 barrels in 1939, or 40,000,000 barrels more than in 1938 and more than double the 1936 use for those purposes.

Outlook for 1940

For 1940 a further increase in world consumption of petroleum is indicated, despite the retarding effect that the wars have had so far on consumption in Europe. For the United States is a dominant factor in world consumption, using nearly two-thirds of all the oil that is consumed, and the total domestic demand in the United States is expected to be around 5 percent greater in 1940 than in 1939. That would be an increase of about 61,000,000 barrels, and even if the countries outside the United States showed no increase, the gain for the world would amount to 3 percent. For the world consumption to show a decrease in 1940, in the face of the indicated increase in the United States, the other countries would have to curtail their use of oil nearly 8 percent. And such a decrease would be in contrast with steady gains every year recently.

Use Expanding Greatly

In the 7 years since 1932, world consumption of petroleum has

Eighteen Countries Account for More Than 90 Percent of World Consumption in 1939

Consumption figures include crude consumed as such, all its products and related fuels such as Benzol, Natural Gasoline, Alcohol used as Motor Fuel. Oil delivered to ships bunkers is included in consumption of country where deliveries made. Figures are from A. I. M. M. E. Paper by V. R. Garfias, of Cities Service Company.

(Figures Indicate Barrels)

COUNTRY	Motor Fuel	Kerosene	Gas and Fuel Oil	Lubricants	Miscellaneous	Total
United States	554,000,000	60,000,000	455,000,000	24,500,000	139,500,000	1,233,000,000
Russia	28,000,000	44,000,000	67,000,000	9,600,000	22,000,000	170,600,000
United Kingdom	46,800,000	7,000,000	29,900,000	2,900,000	4,400,000	91,000,000
Germany	24,200,000	800,000	18,100,000	3,800,000	7,100,000	54,000,000
Canada	24,000,000	700,000	17,000,000	4,100,000	5,000,000	50,800,000
France	24,800,000	1,700,000	16,900,000	2,200,000	4,400,000	50,000,000
Argentina	7,600,000	1,300,000	17,500,000	550,000	1,900,000	28,850,000
Japan	8,000 000	1,500,000	12,000,000	1,800,000	2,100,000	25,400,000
Netherlands W. Indies	270,000	55,000	17,500,000	55,000	5,300,000	23,180,000
Italy	5,700,000	1,000,000	12,200,000	1.000,000	1,900,000	21,800,000
Mexico	3,500,000	800,000	12,700,000	200,000	1,400,000	18,600,000
British India	2,700,000	7,200,000	4,200,000	1,000,000	1,400,000	16,500,000
Rumania	1,100,000	1,250,000	10,500,000	230,000	1,900,000	14,980,000
Australia	7,900,000	1,300,000	3,900,000	500,000	1,150,000	14,750,000
Netherlands	3,900,000	2,100,000	4,100,000	500,000	1,200,000	11,800,000
Netherlands E. Indies	1,500,000	2,000,000	6,200,000	250,000	1,500,000	11,450,000
Iran	650,000	1,300,000	6,000,000	450,000	2,700,000	11,100,000
Sweden	4,800,000	900,000	3,700,000	450,000	800,000	10,650,000
Total 18 Leading Countries	749,420,000	134,905,000	714,400,000	54,085,000	205,650,000	1,858,460,000
Other Countries	49,121,000	18,502,000	85,026,000	4,957,000	7,817,000	165,423,000
World Total	798,541,000	153,407,000	799,426,000	59,042,000	213,467,000	2,023,883,000
Percent of Total Consumed by:						
18 Leading Countries	93.8	87.7	89.0	91.6	97.0	91.7
United States	69.4	39.2	57.0	41.4	65.7	61.0
All Countries Outside U. S.	30.6	60.8	43.0	58.6	34.3	39.0
Russia	3.5	29.0	8.4	16.3	10.4	8.4
United Kingdom	5.8	4.6	3.7	4.9	2.1	4.5
Germany	3.0	0.5	2.3	6.4	3.3	2.7
France	3.1	1.1	2.1	3.7	2.1	2.5
Japan	1.0	1.0	1.5	3.0	1.0	1.3
Italy	0.7	0.7	1.5	1.7	0.9	1.1

shown the remarkable increase of 53 percent, each year having brought a substantial gain. As compared with the 2,023,883,000 barrels consumed in 1939, the world use had been only 1,327,807,000 barrels in 1932.

The consumption of the United States, alone, in 1939, having totaled 1,233,000,000 barrels, was almost as great as the world consumption of 1932. Having climbed to the 1,233,000,000 barrels in 1939, the United States use of oil was 48 percent greater than in 1932, when the total was 835,482,000 barrels.

Outside the United States, however, the consumption of petroleum has increased even more precipitously. The 790,883,000 barrels consumed outside the United States in 1939 almost equaled the 835,482,000 barrels consumed in the United States in 1932 and represented a 61 percent gain over the foreign consumption of 492,325,000 barrels in 1932.

Practically all of the refined products have contributed toward the expansion of petroleum consumption.

World Consumption of Petroleum and Related Fuels, By Years, in Past 8 Years

Compiled from "Petroleum Facts and Figures" and A.I.M.M.E. paper by V. R. Garfias.

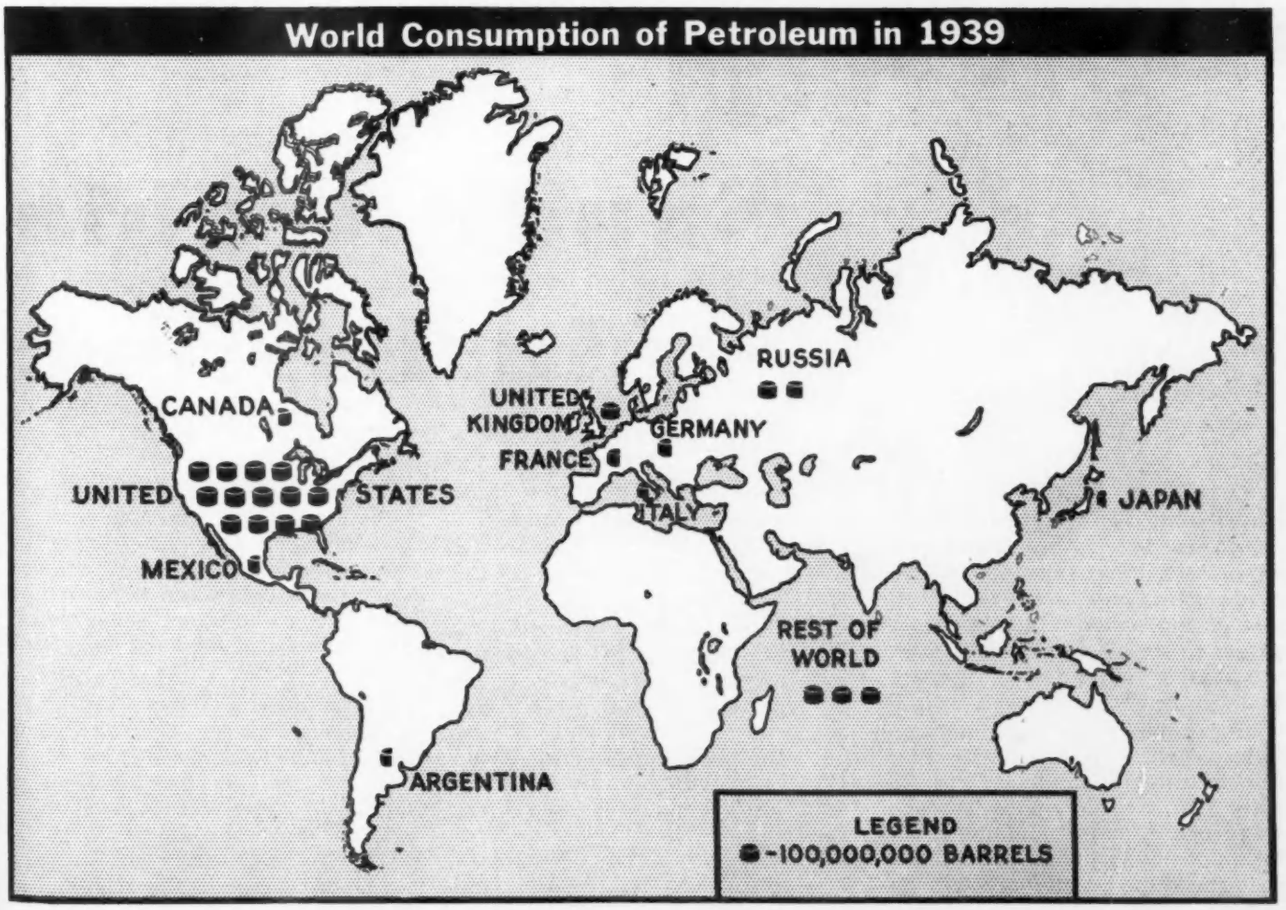
YEAR	United States		Outside United States		World Total
	Barrels	Percent of World	Barrels	Percent of World	
1932	835,482,000	63.0	492,325,000	37.0	1,327,807,000
1933	868,488,000	61.7	538,435,000	38.3	1,406,923,000
1934	920,165,000	61.2	587,434,000	38.8	1,507,599,000
1935	981,650,000	60.9	632,825,000	39.1	1,614,475,000
1936	1,092,750,000	60.9	702,810,000	39.1	1,795,560,000
1937	1,169,682,000	61.0	745,174,000	39.0	1,914,856,000
1938	1,137,123,000	59.4	776,884,000	40.6	1,914,007,000
1939	1,233,000,000	60.0	790,883,000	40.0	2,023,883,000

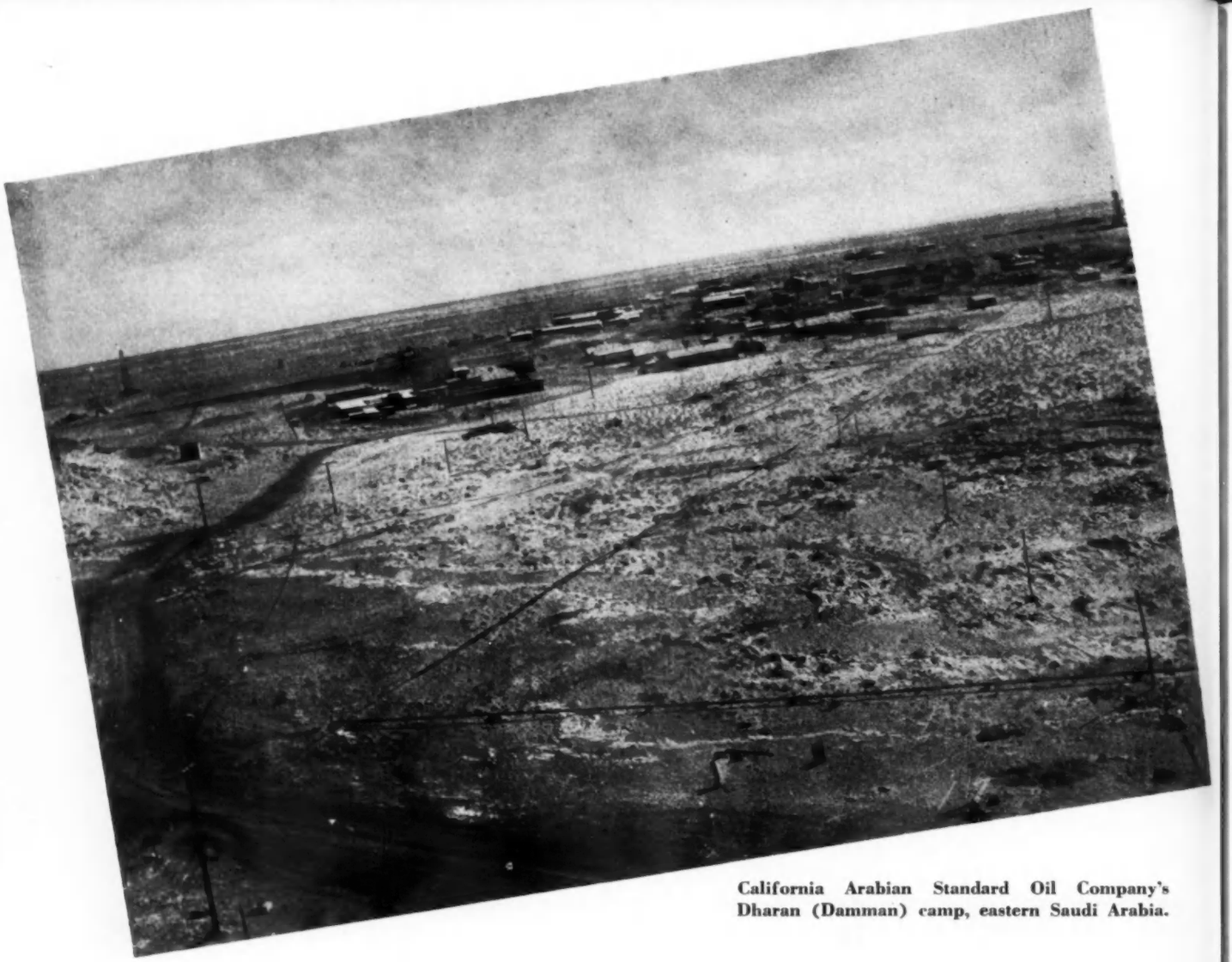
World consumption of motor fuel has risen from 528,609,000 barrels in 1932 to 798,541,000 barrels in 1939, an increase of 51 percent in the seven years, as compared with the corresponding gain of 53 percent for all petroleum and products. The 1939 use was more than 4 percent greater than that of 1938, when the total was 765,079,000 barrels. The United States consumption was up 5.5 percent, but other countries in the aggregate showed a gain of only 1 percent, as there were decreases in some of the larger consuming countries, including the belligerents, United Kingdom, France and Germany.

All countries consumed 153,407,000 barrels of kerosene in 1939, which was nearly 50 percent more than in 1932 and 4 percent more than in 1938.

The world consumption of gas and fuel oil totaled 799,426,000 barrels in 1939, which was 51 percent more than in 1932 and 7 percent more than in 1938.

Consumption of lubricants in all countries totaled 59,042,000 barrels in 1939, or 53 percent more than in 1932 and 4 percent more than in 1938.





California Arabian Standard Oil Company's Dharan (Damman) camp, eastern Saudi Arabia.

Saudi Arabia In Eastern

BAHREIN Island, which had contributed the impressive total of 29,875,609 barrels to the world's supply of oil up to the end of 1939, a few years ago drew the attention of concession-minded oil companies to the potentialities of eastern Arabia, particularly that section bordering the Persian Gulf.

Since then other companies have followed the trail blazed by Bahrein Petroleum Company with results that, at this relatively early stage of Arabian mainland exploration, seem to justify expectation that the region some day will become one of the most important producing sectors of the world.

California Arabian Standard Oil Company has developed commercial production on Damman Dome, locally referred to generally as Dharan, a field almost due west 25 miles across a narrow part of the Persian Gulf from Bahrein Island and just 4 miles inland. Kuwait Oil Company, operating in the Principality of Kuwait that borders the gulf north of Dharan and Bahrein, has uncovered commercial production north of the neutral zone separating Arabia and Iraq.

Because Bahrein's performance will serve in the future as more or less of a yardstick by which to measure the relative importance of the newer fields and others that are likely to be found in the vicinity, a statistical study of its record is interesting.

Bahrein Failures Few

Although 67 oil wells had been completed by the end of 1939, Bahrein had on record only 2 failures, both of which were completed prior to the beginning of 1938. No gas well completions were on record as the year opened. Fifteen of

Most of Arabia's once formidable desert has been motorized as a result of oil operations.

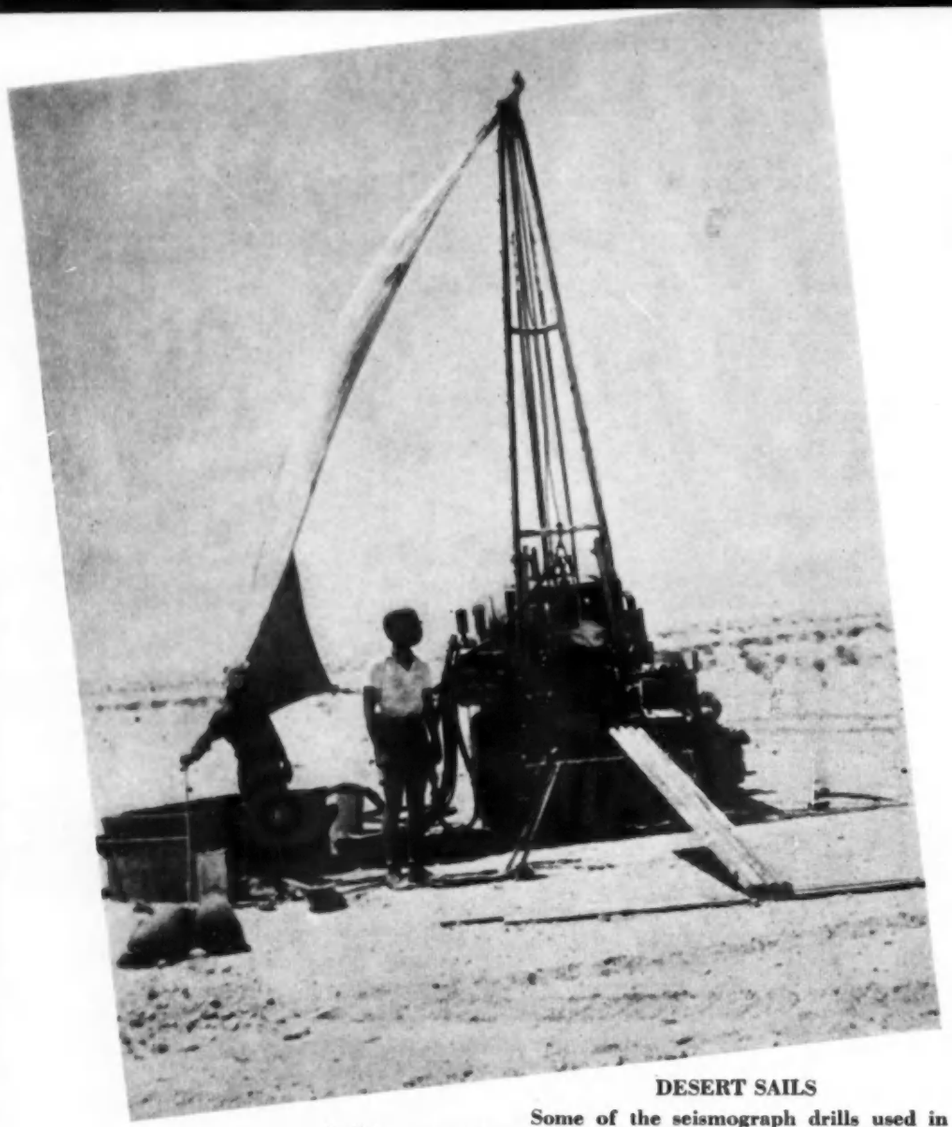
Major Factor Hemisphere

the oil well completions went on record during 1939, as against 7 in 1938. Footage drilled during 1939 totaled 21,184 feet, as against 40,-199 feet for 1938, providing an inverse ratio to completions for the 2 years. Altogether, a total of 186,-523 feet of hole has been drilled on Bahrein, counting that contributed by the two failures of record.

Bahrein showed a slight decline in production during 1939 when recovery amounted to 7,588,554 barrels, as against 8,297,998 barrels for 1938. Production during 1940 will be somewhere near the 1939 figure. Reports are the operating company will plan to keep it stabilized at around 20,000 barrels per day, which would mean a recovery of 7,300,000 barrels for 1940. An unconfirmed estimate puts the unproduced recoverable crude at 150,000,000 barrels, despite the fact that salt water put in an appearance in 1938. This estimate was not made by a Bahrein Petroleum Company engineer.

Dharan Second Largest

On the basis of current production, Dharan, or Damman Dome, is the second most important producing area along the eastern shoreline of Arabia. Unofficially, Dharan's area is put at 10 square miles, its reserve at 300,000,000 barrels. Late development there has been restricted by California Arabian Standard Oil Company to exploitation of the 4300-foot Arab zone in contrast to the early efforts directed at the 2000- to 2200-foot zone. To the end of 1939 the field had recorded 15 completions and instituted a general spacing practice calling for 3000 feet be-



DESERT SAILS

Some of the seismograph drills used in Arabia are equipped with a triangular sail as a protection against the extremely hot sun. This rig, operated by P. Kessinger, was used to drill shot holes from 100 to 250 feet deep.

tween locations. Production during 1939 amounted to 3,933,903 barrels, according to J. O. Nomland's paper on Saudi Arabia, presented recently in New York before the American Institute of Mining & Metallurgical Engineers.

Apparently 5 rigs will be kept busy on Dharan Dome during 1940. The year opened with that many operations listed as drilling or completing in the Arab zone, which yields 35-gravity oil.

Production from Dharan is carried to tidewater through 40 miles of 10-inch line terminating at Ras Tanura. Opening ceremonies for the line were observed in May, 1939, with King Abdulaziz Ibn Saud turning the valve that allowed the oil to flow into the first tanker filled at Ras Tanura. Since then shipments to the terminal have been regular. Part of Dharan's oil goes to Bahrein for refining, but plans of California Arabian Standard Oil Company call for erection of a small refinery at Ras Tanura, where there already is a small plant for treating the oil. Nomland says a stabilization plant has been completed at Dharan.

Exploration Continues

Early March of this year saw exploratory work in full swing in Saudi Arabia. Geologists were busy with reconnaissance and more detailed surface work. Seismograph and gravity meter crews were on the job. Considerable structure drilling was being done, along with extensive triangulation. As a sideline, one engineering party of California Arabian Standard Oil Company was assisting the government in demarkation of the Iraq-Saudi Arab boundary.

One of the disappointments of 1939 wildcatting on the large concession of the above organization was failure of an exploratory test on the Abu Hadriya structure to show anything of commercial importance down to 8655 feet, at which depth it was drilling as the year opened. This structure, located 100 miles northwest of Dharan, is a large dome. Among geologists in Bahrein, Kuwait and Arabia, there is speculation as to the relationship between the fields existing and to be found in the three. The Abu Hadriya wildcat will be valuable as a contributor to information on this subject even though it should eventually result in a dry hole.

Should Abu Hadriya prove productive, and it is considered by some to be too large a structure to abandon without more drilling, the California Arabian Standard Oil Company probably would authorize construction of a pipe line from the structure to the Persian Gulf Port of Manifa, recently found to be suitable for a loading terminal. This would call for 18¾ miles of line.

A second test on the company's concession is on a domal structure 120 miles west of Dharan field. It probably will be June before this initial test of a large structure reaches objective depth. Nomland reported Ma'agala 1 at only 1372 feet, without commercial oil or gas showings, in his paper.

Should Ma'agala structure prove a producible crude reservoir, a market outlet could be provided by construction of a line to Damman, though it would take a substantial amount of production to justify the investment. Such a project would have to traverse 120 miles.

Qatar Peninsula Looms

In addition to the above two exploratory projects, Petroleum Concessions, Limited, an affiliate of Iraq Petroleum Company, has a wildcat drilling on the coast of Qatar Peninsula which is reported to have logged commercial showings of oil and gas. This wildcat also is said to have established for the region a stratigraphic similarity to Bahrein Island.

Kuwait Oil Company, a joint enterprise of Gulf Oil Corporation and Anglo-Iranian Oil Company, completed three wells in 1939 in Burghan, a new field in the southern part of Kuwait that promises to contribute heavily to Arabia's importance as a source of production. Production tests on these wells, taken in consideration with the size of the structure, indicate

CHINA
RUSSIAN TURKESTAN
AFGHANISTAN
BALUCHISTAN
INDIA
INDIAN OCEAN
RUSSIA
CASPIAN SEA
IRAN
PERSIAN GULF
OMAN
GULF OF ADEN
BLACK SEA
TURKEY
SYRIA
IRAQ
ARABIA
YEMEN
ADEN
RED SEA
MEDITERRANEAN SEA
EGYPT
SUDAN
ABYSSINIA
ERITREA
GREECE
ANGLO-IRANIAN CONCESSION
NEW CONCESSION
NEW CONCESSION
CASOC
HADHRAMAUTH
NEUTRAL ZONES
CRUDE OIL PIPE LINE
BENGASI PIPE LINE
TASHKENT
ANDIJAN
STALINABAD
KABUL
KANDAHAR
QUETTA
BHATINDA
UDAIPUR
BOMBAY
KARACHI
BELA
GWADAR
PANJAB PINDI
TURT KOL
GUZAR
MAIMANA
MERV
HERAT
FARAH
TABAS
MESHED
KASHAN
ISFAHAN
SAIDABAD
BAM
BAMPUR
JASK
LAR
BANDAR ABBAS
MUSCAT
ASHKHABAD
KRASNOVODSK
TEHERAN
HEMADAN
BIZFUL
TABRIZ
RESHT
GARU
KIRKUK
BAGHDAD
HABBANIYA
RAMADIE
KUWAIT
BUSHIRE
ABU HADRIYA
DAMMAM DOME
RIYADH
MECCA
JIDDA
MEDINA
ALEPPO
DAMASCUS
BEIRUT
TRIPOLI
HAIFA
JERUSALEM
TRANS-JORDAN
PALESTINE
PORT SAID
SUEZ
CAIRO
ALEXANDRIA
ATHENS
ISTANBUL
ANKARA
SINOP
MERSIN
ANDAHYA
ADEN
MUKALLA
GUSH SAIHUT
HODEIDA
TOKAR
PORT SUDAN
LUXOR
Showing recent distribution of oil concessions in Arabia.

the British and American interests have uncovered here a crude reserve of sizeable proportions. Definite information on the area is lacking due to the current English policy on publicity in connection with articles dealing with oil industry activities.

Production obtained thus far at Burghan is said to be higher in the section than that obtained at Dharan, which is in the Lower Cretaceous from a member about equivalent to the Nubian sandstones. First production at Burghan was developed at 4700 feet. The field is undefined. No estimates of its reserve rating are available.

It is likely a line soon will be laid from Burghan to the town of Kuwait, which lies only 25 miles to the east and which would afford a suitable site for a loading terminal on the Persian Gulf.

Topography

The topography of Arabia is low and monotonously barren over most of its territory, with only the giant "singing sand dunes" of the Ruba Al Khali on the southeastern extremity to give Arabia its so-called highlands. Most of Arabia's elevation is below 300 feet. That of the highlands does not exceed 1000 feet. This southeastern territory is one of the areas in which a concession last year was acquired by California Arabian Standard Oil Company. The first concession, obtained in 1933, extended along the Persian Gulf from the southern border of Iraq to the border of Oman on the southeastern tip of Arabia.

Following geological work and aerial surveys, geophysical work was started on holdings of California Arabian Standard Oil Company in 1937. Core drilling to establish bench marks and to pick up the Eocene marker bed on the concession started in November, 1938.

Drilling "Tough"

Saudi Arabia's first wells were drilled with gasoline rigs and completed at around 2000 feet with difficulty. A hard porous limestone found around this depth resulted in three of the early wells having to be completed flowing through rock bits. Twist-offs were troublesome, as was maintenance of circulation. Importation of heavier equipment, however, solved the problem and permitted exploration for deeper sands, which were found.

Drilling conditions in Arabia are said by California drillers to be the world's worst. Only through use of the best equipment and technique is it possible to complete a well without trouble. In some spots circulation is lost between 100 and 1750 feet, due to porosity of the limestone formations. Salt water from the gulf is used for circulating when penetrating this zone. It is supplemented by commercial gels, according to C. Ross Spencer, to hold the cuttings away from the bit when a joint of drill stem is added.

Dharan wells set the first string of pipe at 1750 feet. Between 1775 and 1850 feet, extreme care must be taken to keep the mud at the proper balance to maintain circulation. The mud must be allowed to bake on the walls of the hole.

Personnel care of California Arabian Standard Oil Company in Saudi Arabia has been exemplary. Air conditioning, a club house, a tennis court, an ice factory, a water distilling plant, a hospital and a laundry are among things made available for the employee at Dharan. The housing unit is modern and commodious.

The air conditioning is used not only in the work structures, but also in all homes and bunkhouses. Furnished five-room houses are available for some of the families, according to the amount of service to the credit of the employee. Bachelors live in semi-private quarters.

In conclusion, cognizance should be taken of the fact that Saudi Arabia is destined to become an even more decisive factor in the world market, especially in Europe, Africa and Asia, where the sales organization of The Texas Company, joint owner of California Standard Arabian Oil Company, is used as an outlet. Bahrein Petroleum Company likewise is a joint interest of The Texas Company and Standard Oil Company of California. However, in view of the increasing demand for petroleum, development of the Saudi Arabia fields probably will not cause other fields to curtail operations.

It is not likely that European hostilities will seriously influence activity in the area as Great Britain controls the Persian Gulf, as well as Iraq and Egypt.

Seismograph camp at Jebel Eneriya, 200 miles from Dharan (Damman) Dome, Arabia.

Cost-Smashers FOR LOADS, ROADS AND RIGS!

Ruggedness, dependability, and low fuel-consumption. Those are what "Caterpillar" Diesel Engines use to smash costs on drilling, mud pumping, oil pumping, string pulling and every other job that takes stationary power! A day, to them, is 24 hours . . . any day you give the word!

Owned by the Portable Drilling Company, of Tulsa, Oklahoma, these "Caterpillar" Diesel D13000 Engines are driving a rotary draw-works and a 7¼ x 14 Gardner mud pump in the Keokuk Falls Field near Seminole. Each engine uses only 5½ to 6 gallons of 5½-cent fuel an hour!

Good roads save you money. And here's the machine that can build them for you . . . quickly and economically! It's a "Caterpillar" Diesel No. 12 Motor Grader. With a wide-reach, high-reach, fully revolving blade, it has enough power and traction to head, unassisted, into unbroken country and unroll a real road—not just a trail!

The outfit illustrated is owned by the Joseph Kesl Rental Equipment Company, St. Louis. Used for road-maintenance as well as building, in the Southern Illinois Field, it consumes only 1½ gallons of 8-cent fuel an hour!

Heavy loads that have to be pushed, lugged or lifted . . . pipe-line work . . . rig moving . . . slush-pit digging . . . well servicing . . . supply hauling . . . all become low-cost, on-time jobs when a "Caterpillar" Diesel Tractor takes hold! And these machines are proving that, every hour of every day, in oil fields all over the world. They're sure-footed in their traction. Powerful at the drawbar. Rugged enough for steady going. Built with a precision and stamina that keep down repair costs. And sparing with inexpensive fuel!

The outfit illustrated here, a "Caterpillar" Diesel D7 Tractor, is owned by the Kiowa Drilling Co., Salem, Illinois. Works 8 hours a day; uses only 3 gallons of 9-cent fuel an hour!

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DIESEL ENGINES • DIESEL-ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

Respect of Customs Vital in Foreign Exploration [1]

By J. E. BRANTLY
President of Drilling & Exploration Co., Inc., Los Angeles

THERE are three points of view involving domestic and foreign production in which the American is interested and for which more or less logical arguments may be presented.

One calls for concentration on the development of the industry in our own country to the exclusion of the development of the industry in other countries and the export of all of the oil and its products for which a market can be found. But this would be selfish and short-sighted policy and would rapidly deplete our resources and reserves.

The reverse of this policy has some advocates—those who would encourage the maximum development of foreign resources and the maximum importations of crude oil into this country in order that our own resources might be conserved to the greatest possible extent. But this, too, would be selfish and harmful. It would greatly reduce the value of our own domestic production and work innumerable hardships on a vast number of the members of the industry.

The Altruistic View

The third point of view is altruistic, though with an altruism which serves our commercial purposes. This involves the production of our own oil for our own needs under methods that would promote the maximum conservation of the product, and also to assist the peoples of other nations within whose boundaries there are petroleum reserves in exploiting their own petroleum resources in the ideal manner, in supplying their needs and, to the extent which they logically can, the needs of other nations.

Most Important Contacts

Close at hand and probably the most important now and in the future, at least to the United States of America, are those regions to the south of the Rio Grande, particularly in South America, in which oil is now being produced and may be produced in later years.

Mexico Important

First, and oldest of major importance are the oil fields of the Tampico region of Mexico, then the Atlantic side of the Isthmus of Tehuantepec in the same country. Going southward there are possibilities of production in Honduras, Guatamela, Nicaragua and Panama. Next we cross into South America, where there is presently production in Venezuela, Colombia, Ecuador, Peru and the Argentine, with some small wells having been completed in Bolivia.

The largest country of them all is the United States of Brazil which, unfortunately from the standpoint of petroleum possibilities, is largely an Ancient Landshield of old crystalline rocks in which petroleum does not occur. However, there are substantial areas immediately along the coast, in the upper Amazon country, and in the extreme southern part of the nation that are known to be petroliferous. Quite a number of shallow wells have been drilled in these regions of Brazil and some showings of oil have been found, but as yet no commercial production obtained. Three strings of tools are operating on the eastern shore, one in the edge of the city of Maceio and the other two within the city limits of Sao Salvador in the state of Bahia.

Great Potentialities

Paraguay and Uruguay are not without possibilities, while the Guianas, British, Dutch and French, are likewise prospective areas. In fact all of South America, with the exception of the Brazilian Landshield and the Andes Mountains proper, offer excellent possibilities of yielding oil.

Probably the region of greatest possibility is that narrow belt which lies between the Andes mountain system and the Brazilian Landshield extending from Trinidad through central Venezuela, the eastern parts of Colombia, Ecuador, Peru, Bolivia, practically all of the Argentine east of the Andes, and down to Tierra del Fuego, the southern extremity of the continent. There are likewise petroliferous regions along the Pacific seaboard from Colombia into Peru and in Chile.

Wells Expensive

Thus, there is an enormous area in South America that is probable oil territory. Eventually it will be tested with wildcat wells, broadcast more or less as are those in the United States, but we hope on sounder technical and scientific advice, for in this country probably the great majority of the wildcat wells have been drilled for no other reason than that a block of acreage was available to some individual or group having an abundance ot optimism. But wells here are relatively inexpensive. In the isolated regions of South America they are terrifically expensive. A wildcat well in some jungle country may easily cost $500,000 or more.

Money Needed

The countries to the south of us are not highly industrialized as is this country. Among their peoples they do not have the trained oil technicians as we have, for they have not had the opportunity of gaining the necessary experience. Our particular industry is probably the most exacting of all having to do with the development of natural resources. The finding of oil is extremely difficult and a very hazardous undertaking. The production of oil with reasonable

[*Continued on page 220*]

[1] Extracted from a paper presented before a recent meeting of the Los Angeles Chapter of Nomads.

BAKER'S *Contribution* TO THE SCIENCE OF OIL WELL CEMENTING...

THIRTY years ago, the possibility and advantages of using cement to shut off water in oil wells was just becoming recognized. But there were problems . . . such as how to put the cement away and how to place it in such a manner that a perfect cement job would result.

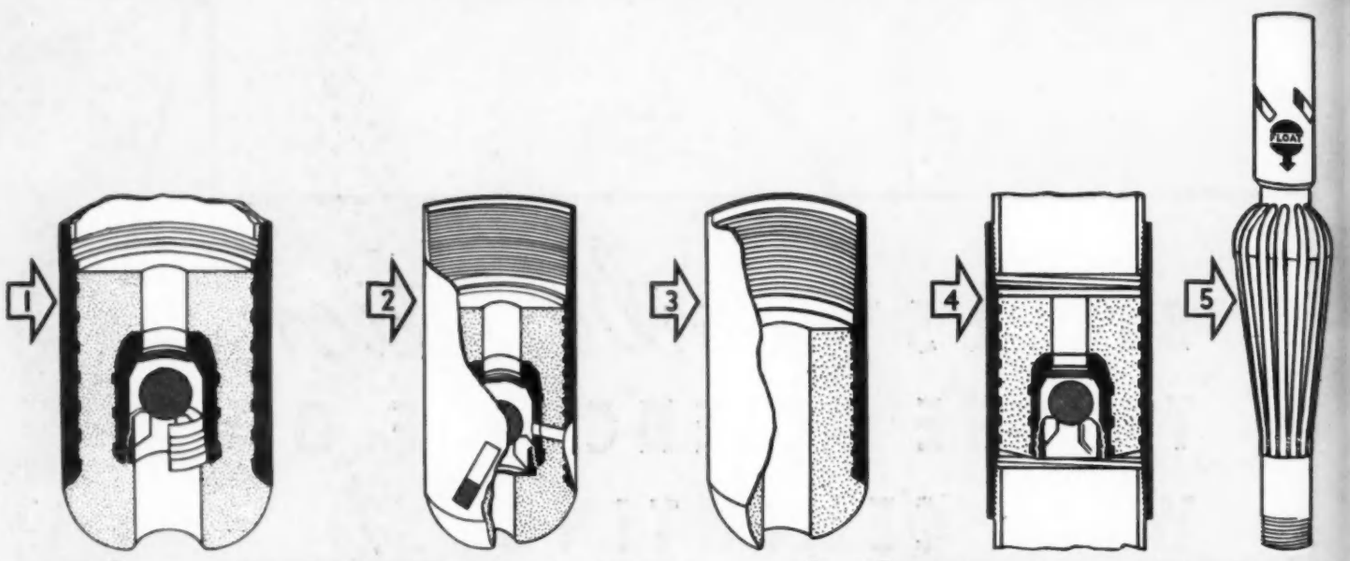
As usual, when a need arises, someone, somewhere, figures out a method and a means for getting the job done. Among the early pioneers in the cementing art was R. C. Baker, and the method he figured out resulted in the invention and development of a line of special cementing devices such as the Baker Cement Retainer, Sure-Shot Cement Plug, Cement Dump Bailer and later, the now famous line of Baker equipment for Guiding, Floating and Cementing Casing, containing a "floating" unit with plug made of special Baker-Formula Concrete into which was anchored a positive-acting Bakelite Ball-Type Back-Pressure Valve. This gave to the industry for the first time, real meaning to the words STRENGTH — VALVE EFFICIENCY and *DRILLABILITY* as applied to Guiding, Floating and Cementing Equipment.

Still striving for better cementing results Baker more recently introduced Shoes and Collars with baffled side ports . . . these baffled ports imparting to the cement slurry a whirling action which greatly facilitated the effectiveness of the cement job by placing a more nearly uniform body of cement around the Shoe and up and around the casing . . . minimizing the ever-present hazard of channeling . . . a distinct contribution to the art of oil well cementing.

Coincidental with the later development of Baker Float Shoes, Float Collars and other similar casing equipment, there arose the need for an *improved* Cement Retainer . . . one which would achieve results where everything else had failed . . . a device, for example, that would permit putting away cement under extremely high pressures, pressures greater than could safely be used by other means of cementing; a device that would permit doing a cement job at any point behind the casing or in the open hole by applying a "squeeze" to the cement and holding the pressure on it without the aid of surface equipment. Baker provided the solution of these difficult problems by giving to the industry the *Baker Model K Cement Retainer.* From its inception, this amazing tool was destined to be successful.

Experience gained from the running of thousands of Cement Retainers influenced certain changes in the design, construction and operation of this device . . . changes necessary to meet the trend in modern oil well drilling and completion methods. Today the Baker Model "K" Cement Retainer stands alone in its field as an amazing device that has consistently performed the "impossible" . . . and in doing so, has justly earned its reputation, along with Baker Cement Guiding, Floating, Cementing Equipment, as being an outstanding contribution to the science of oil well cementing.

BAKER OIL TOOLS, INC



The BAKER Line of "PRACTICAL

These tools and devices are "Practical and Dependable" for 6 good reasons . . . because they are . . .

1. Correctly Designed
2. Manufactured to exacting standards and specifications
3. Made of quality materials by skilled workmen
4. Safe to use
5. Efficient and Economical in operation AND . . .
6. Because they perform in a manner and *achieve results* that afford operating personnel that much to be desired "Peace of Mind".

"REMEMBER . . . YOU CAN DO IT BETTER WITH BAKER"

1 BAKER CEMENT FLOAT SHOE. The internal construction of the Baker Cement Float Shoe consists entirely of Baker-Formula Concrete and a small amount of Bakelite . . . which are easily drilled up and circulated out of the hole. It is also provided with the efficient Baker BALL-TYPE Valve, with buoyant Bakelite Ball, which instantly double-seals against a narrow rubber seat at the slightest reversal of pressure. Like all Baker Floating Units, it combines in a perfectly balanced combination the three Baker features of STRENGTH—VALVE EFFICIENCY—DRILLABILITY.

2 BAKER CEMENT WASH-DOWN WHIRLER FLOAT SHOE. This shoe, the most efficient cementing unit of its kind yet devised, embodies all of the features essential for the successful landing and cementing of casing. It safely and efficiently accomplishes the following RESULTS: 1. GUIDING is easily and efficiently done, due to the rounded nose of the concrete guide which leads the casing past all side wall irregularities. 2. FLOATING is safely performed, due to the BALL-TYPE Back Pressure Valve, which provides a leak-proof seal against either high or low pressure. 3. REMOVING BRIDGES and WASHING DOWN is accomplished by the downward, hydraulicking action of the circulating fluid through the baffled "Down-Whirler" ports. 4. WASHING FORMATION at and above the cementing point, effectively conditions the wall of the hole preparatory to the final cementing operation. 5. BETTER CEMENTING is accomplished by the definite DOWNWARD, as well as UPWARD, whirling action imparted to the cement in its travel around the shoe and upward around the casing . . . this action insures best possible encasement of the pipe with a uniform body of cement . . . minimizing channeling. 6. DRILLABILITY is always assured, as the internal construction of this unit consists entirely of Baker-Formula Concrete and a small amount of Bakelite, which are easily drilled up into small, harmless fragments and circulated out of the hole.

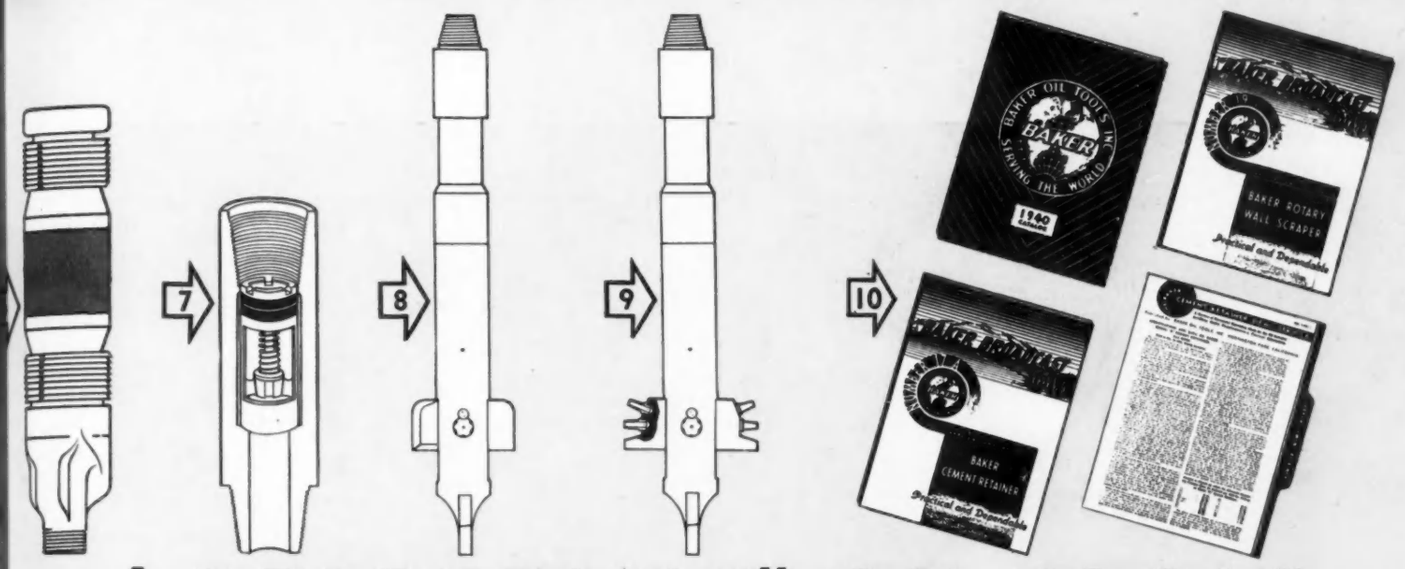
3 BAKER CEMENT GUIDE CASING SHOE. The internal construction of this unit consists entirely of Baker-Formula Concrete, providing the important advantages of Strength and Drillability. It is usually used in combination with one or more Baker Cement Float Collars.

4 BAKER CEMENT FLOAT COLLAR. Many operators, when setting casing, prefer to have the principal "float valve" in a Collar, positioned one or two joints from the bottom . . . and the Baker Cement Float-Collar provides this feature. It also serves as a stop for the cementing plugs, thus retaining cement tailings inside the casing and insuring a better consistency of cement outside of the shoe and casing. *This unit has the same internal construction as the Baker Cement Float Shoe.*

5 BAKER CEMENT WHIRLER FLOAT COLLAR with SOLID BOTTOM BAFFLE with METAL "PETAL" BASKET. This unit provides a means of cementing casing at any desired depth and is widely used for cementing combination strings. A solid concrete baffle diverts the cement and forces it through the baffled side ports and up and around the casing with a whirling motion. With the Back-Pressure Valve Assembly and internal construction consisting of concrete and Bakelite, this unit possesses the important features of Strength, Valve Efficiency and Drillability. The Metal "Petal" Basket with which this unit is equipped serves as an outside packer or barrier during and following the cementing job. It also protects the formation from cement contamination and cavings, as well as prevents any dissipation of the cement slurry.

6 BAKER Model "K" CEMENT RETAINER. The Baker Cement Retainer solves many usual and unusual cementing problems by providing a sure and safe means of placing cement through tubing or drill pipe at the point where it will really be effective around the shoe; at any pre-determined location behind casing or liner; or in open hole immediately below the pipe. It minimizes the danger of sticking or plugging tubing or drill pipe by the "tubing" method of cementing; it is

BAKER



and DEPENDABLE" OIL TOOLS

adaptable to any pressure, and is particularly suitable when circulation is difficult or impossible to obtain.

Important Cement Retainer Applications Include: Squeeze Jobs; Re-Cementing; Cementing Behind Sections of Pipe; Reducing Gas/Oil Ratios; Series Cementing; Plugging Off Bottom Fluids; Plugging Back to Upper Zones; Testing Upper Cased Formations; As a Heaving Plug; As Bridge Plug at any Place in Casing or Liner; Open Hole Acidizing; Open Hole Squeeze Cementing; All Kinds of Repair Work in Drilling or Producing Wells.

7 BAKER BAKWIK Model "B" DRILL PIPE FLOAT. The Baker Bakwik Model "B" Drill Pipe Float with Model "B" Valve Assembly provides the many advantages of a back-pressure valve in the drilling string with a Valve Assembly constructed entirely without threads, being held in position by the tool joint pin above it. The Valve Assembly is so designed as to provide positive and instantaneous sealing, assuring long life and maximum protection against costly and dangerous by-passing.

8 BAKER ROTARY WALL SCRAPER. This tool provides a safe, efficient means of enlarging the walls of an open hole to a diameter considerably greater than the casing or hole through which the tool is run. Its outstanding features are Strength and an Amazing Reaming Capacity.

Efficient applications for the Baker Wall Scraper include: Setting Liners; Setting Cement Plugs; Bottle-necking for Cementing Purposes; Enlarging Holes for Casing; Enlarging Holes for Gravel Packing; Straightening Holes; Fishing Jobs; Water Shut-Off Tests; Removing Sections of Drillable Pipe; . . . AND Taking Cores from Side Walls of a Previously Drilled Hole by Substituting Sampler Blades for the Regular Scraper Blades. This converts the Wall Scraper into a Baker Wall Sampler . . . which tool is described below.

9 BAKER ROTARY WALL SAMPLER. With this device it is possible to take actual cores from the side walls of any uncased hole at any depth and thus open up new opportunities for restoring lost core records, or for checking formations which were not cored when drilled through. It also provides a positive means of checking interesting zones brought out by electrical coring methods.

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For Complete Information On These As Well as Other Baker "Practical and Dependable" Oil Tools
10 *Refer to or Send For the Following:*

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- ★ Individual 1940 Baker Catalog (a reprint of the Baker Section in the Composite Catalog).
- ★ Baker Sections in the 1939-1940 Drilling Equipment Directory.
- ★ Baker Broadcast No. 17-A, a comprehensive 40-page treatise describing and illustrating the many important applications for the Baker Model "K" Cement Retainer.
- ★ Baker Cement Retainer News Service . . . a monthly Bulletin Service of successful operating ideas involving the Baker Cement Retainer and its latest applications. (A post card request will place your name on the mailing list).
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R OIL TOOLS

Aviation Has Hurried Up Foreign Oil Expansion

Far-flung operations are consolidated by air movement of men and materials

By Z. H. MISCHKA, Staff Writer

AVIATION, providing fast transportation for men and materials, has contributed materially to the rapid expansion of foreign oil development during recent years.

Air travel has made exploration and development possible in areas that otherwise, under all other conditions, would have been inaccessible, and has also provided convenient and rapid transportation to many regions that normally would require weeks to reach otherwise.

Private and chartered planes particularly have become an important factor in commercial development of the Southern Hemisphere, while scheduled flights of government planes and by airways receiving assistance of the various South American governments are becoming steadily more frequent and the routes more numerous.

Sparsely-populated areas, separated by intervening jungle, desert or mountain range, make road and railroad building impractical, and in some sections impossible—virtually leaving development dependent upon air transportation.

Commercial aviation's recent progressive strides, which might be described as paralleling modern progress of the oil industry, also has closely linked together the different South American countries and provide a close tie between them and the United States. Air travel has gained recognition as the preferred transportation method linking South American oil fields with United States centers of technical knowledge and experience, capital and supplies that are exerting a growing influence upon their development.

Distances that a few years ago took weeks to travel by boat or over land are now spanned in hours or days, effecting a marked saving in time, money and man-energy.

The airways were used extensively by the oil industry during the past year in movement of men, individually and in large groups, and in transportation of materials, in small lots and in plane-loads.

Venezuela is now in its third decade as an oil-producing country. During its early years it was necessary for the industry, directed from the United States, to send its geologists, engineers, drillers and other personnel to the South American country by means of long steamship trips taking days and weeks across the Caribbean Sea, thence by boat, canoe and every other known means of conveyance into the wilds to reach the destination.

Travel to Venezuela, as well as to other South American countries, underwent a decided change beginning back in 1928 with establishment of the first air line between Miami, Florida, and Cuba. Regular steamship service was available from Havana to Panama. Extensions of this service have been frequent, and it was not long before regular air transport facilities were available from Havana to the Canal Zone, then directly across the Caribbean from Jamaica and Barranquilla, Columbia. Now regular and frequent service is supplied to every important coastal city of South America and many important inland cities, including every capitol on the continent.

Trips by air are now regularly made from the oil centers of Texas and the Mid-Continent, and New York, to South American oil countries in two days; a marked contrast to the weeks required for the same trip in earlier years.

The United States, as a part of its long-time program of commercial supremacy in South America, has encouraged pioneering by American aviation interests. That continued interest in South American aviation would be shown by the government was contained in a statement made last month by Secretary of State Cordell Hull suggesting an accelerated air expansion campaign in Latin America.

"In order to preserve the enviable position achieved by the United State aviation services in the New World, constant progress must be maintained," Hull said. "While the present activities of foreign services in South America have naturally been curtailed or retarded as a result of the war, there seems to be no doubt but that the conclusion of hostilities will be followed by strong renewed efforts in that area. With all of the foregoing factors in mind, it is believed that advantage could well be taken of the present opportunity to increase the frequencies of United States air transport services, to the extent that the Congress may be disposed to appropriate funds therefor."

The number of oil company engineers and operating executives who regularly travel the swift skyways south today run into hundreds, and perhaps thousands. For instance, in recent months a group composed of 400 men was needed to construct South American Gulf Oil Company's Barco oil line in Columbia. These men were provided air transportation from the United States, and the large group movement was carried out without a hitch. It is almost impossible to compute the saving of time and money represented by the multiple travel of this one group alone.

Construction of the Barco line, a 263-mile project completed last October, also provided the greatest movement of freight by air in the history of the oil industry. Four specially-designed freighters and six other planes were used to carry 11,000,000 pounds of material. A total of 1,100,000 kilometers, or more than 687,000 miles, were traveled in 6000 flying hours.

For construction of a single bridge, 240 trips were made to bring in 8000 bags of cement, steel bridge members, concrete mixers and other materials. Five airports were constructed for use in the project—at Covenas, El Retiro, Ayacucho, Tarra and Oru.

Air transport service is particularly striking in cases of emergency, and emergencies in the oil industry are not uncommon. An oil well fire recently broke out near Maracaibo, Venezuela. All local facilities were brought to bear in an unsuccessful effort to extinguish the blaze. The well roared on, and finally a cable went to the United States and two famous fire fighters took the air for the southern port. They were in Miami the following morning, and off on a clipper ship for the trans-Caribbean flight. That evening they were at Barranquilla, Venezuela, and before noon of the next day they were at the scene of the fire. Under their direction the fire was shortly extinguished. The trip cut off some two weeks of burning of this major well.

In these and other ways, usually less spectacular but nevertheless important, aviation is filling an important role in oil development abroad.

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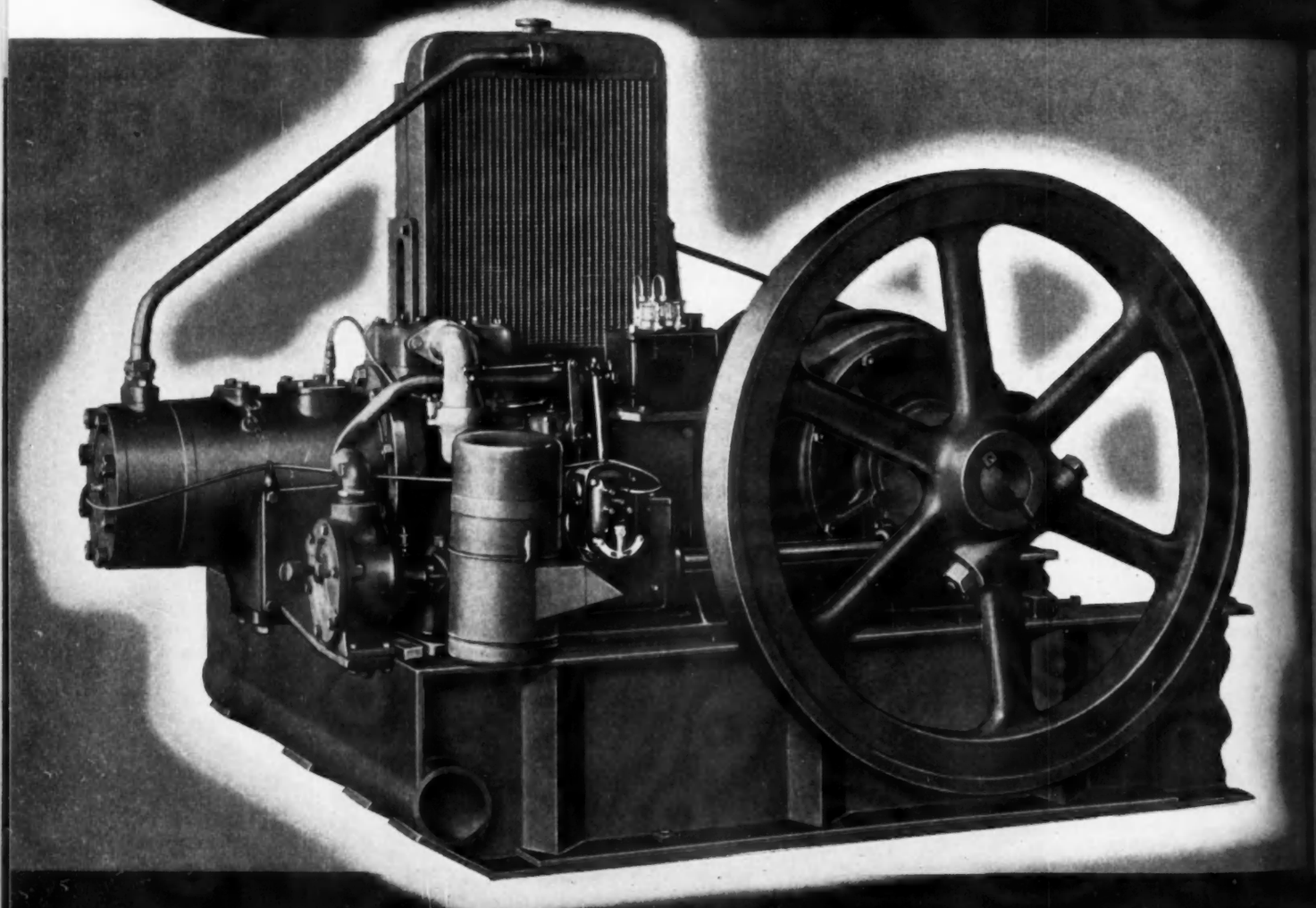

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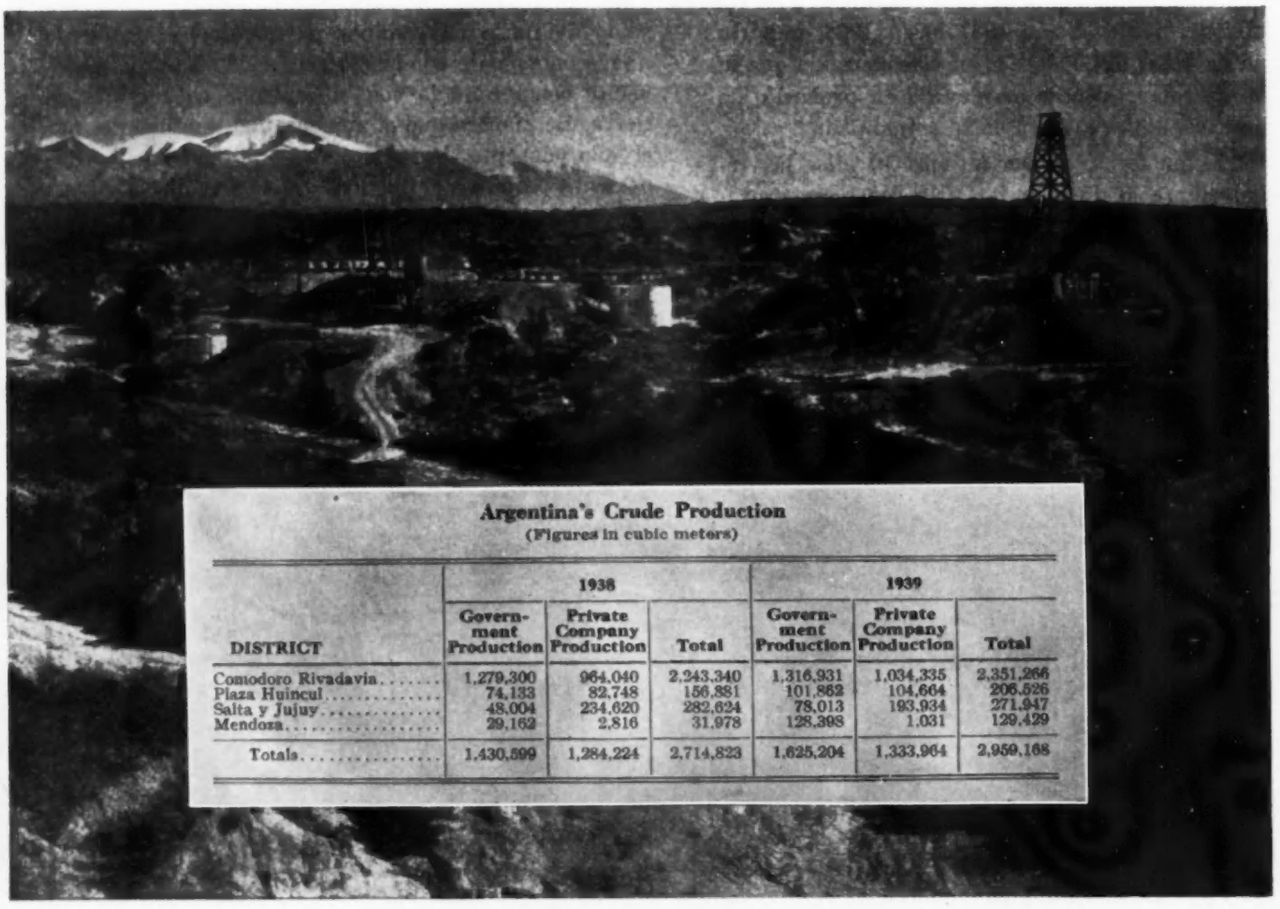


Argentina's Crude Production
(Figures in cubic meters)

DISTRICT	1938 Government Production	1938 Private Company Production	1938 Total	1939 Government Production	1939 Private Company Production	1939 Total
Comodoro Rivadavia	1,279,300	964,040	2,243,340	1,316,931	1,034,335	2,351,266
Plaza Huincul	74,133	82,748	156,881	101,862	104,664	206,526
Salta y Jujuy	48,004	234,620	282,624	78,013	193,934	271,947
Mendoza	29,162	2,816	31,978	128,398	1,031	129,429
Totals	1,430,599	1,284,224	2,714,823	1,625,204	1,333,964	2,959,168

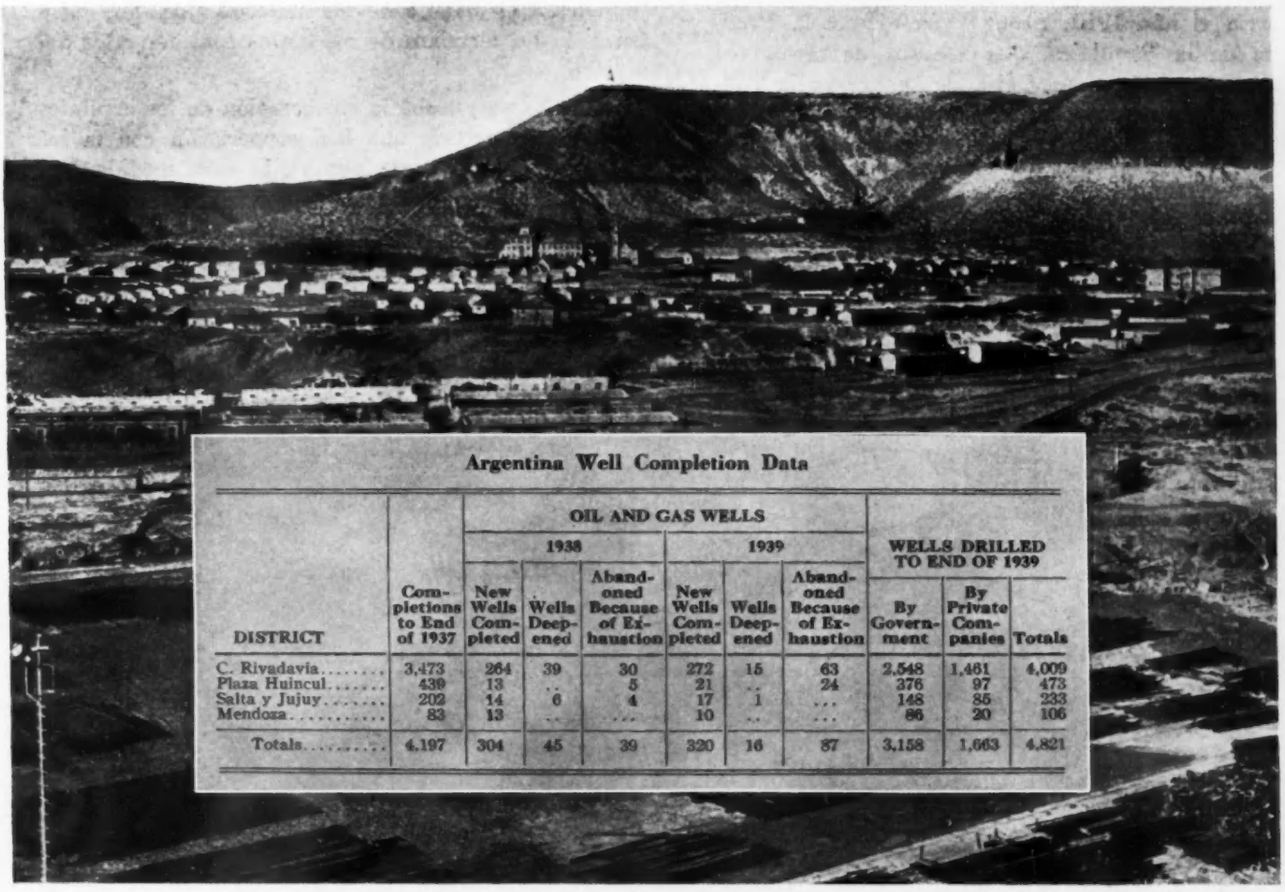
Argentina's most valuable development at Tupungato, Province of Mendoza.

Argentina's Newest Strike Comodoro

DEVELOPMENTS during 1939 indicate a possibility that the new field of Yacimientos Petroliferos Fiscales in the region of Tupungato, Province of Mendoza, may some day become a second Comodoro Rivadavia for Argentina. One completion there during the year recorded an initial production of 500 barrels per hour from a thick Cretaceous sand, but the prime importance of Tupungato lies in the fact that the area's behavior suggests that a long north-and-south syncline in that section of the country may prove productive in spots over many miles. This syncline may provide the Province of Mendoza with a production set-up comparable to that of the famous Golden Lane of Mexico.

Tupungato's discovery well actually was completed in November, 1938, but it was not until the year just closed that the potential importance of the strike was appreciated fully. The first producer went on normal flow at 1796 meters, and for better than a year averaged more than 1000 barrels per day of flowing production. Cumulative production of the well up to the end of the year totaled 65,824 cubic meters, notwithstanding the rate of production in comparison to the well's ability to produce is considered conservative. [One cubic meter equals about 6.3 barrels.]

Drilling in the Tupungato region in 1939 resulted in completion of four additional step-outs in the interim from May through December.These were all productive, and established reservoir zones at from 1839 to 2048 meters, giving a columnar range of 252 meters, or 829 feet, for the pay stratum. Aggregate production of these latter four completions during 1939 was 58,668 cubic meters, showing that the



Argentina Well Completion Data

DISTRICT	Completions to End of 1937	OIL AND GAS WELLS 1938 New Wells Completed	1938 Wells Deepened	1938 Abandoned Because of Exhaustion	1939 New Wells Completed	1939 Wells Deepened	1939 Abandoned Because of Exhaustion	WELLS DRILLED TO END OF 1939 By Government	By Private Companies	Totals
C. Rivadavia	3,473	264	39	30	272	15	63	2,548	1,461	4,009
Plaza Huincul	439	13	..	5	21	..	24	376	97	473
Salta y Jujuy	202	14	6	4	17	1	...	148	85	233
Mendoza	83	13	..	...	10	..	...	86	20	106
Totals	4,197	304	45	39	320	16	87	3,158	1,663	4,821

Central camp for Argentina's Comodoro Rivadavia field.

Promises to Rival Famous Rivadavia

discovery well was not a freak performer.

Relatively little was known of the subsurface characteristics of the new pool by the end of 1939, with the result that Yacimientos Petroliferos Fiscales will continue three rigs in operation during 1940 in an effort to define the producing limits of the Tupungato strike. Vertically or horizontally, potentialities of the field are unknown. But it is known to be a large proposition.

Mario Villa, general manager of Yacimientos Petroliferos Fiscales who was kind enough to furnish the three tables accompanying this text, advises that another discovery of interest which was also achieved by the state organization in the Province of Mendoza was that of Lunlunta, 32 kilometers northeast of Tupungato. The first producer, which went on production in December, 1939, found a petroliferous zone at 2253 meters (one meter equals 3.29 feet) capable of sustained natural flow at the rate of 40 cubic meters, or about 240 barrels, daily.

No discoveries of importance were recorded anywhere in Argentina by private companies.

However, development at Rio Pescado, a relatively new field, shows four wells completed during 1939, probably Nos. 4, 6, 7, and 11, to give the field a rating of 400 proven acres. This may be expanded during 1940 as rigs are running on Nos. 12 and 13. Nos. 1 and 5 were abandoned, while Nos. 2 and 3 were completed for 19 and 63 barrels daily, respectively. Early in 1940 No. 10 initialed 881 barrels.

As Rio Pescado is credited averaging only 30 barrels per day during 1939, expectation of an increase for 1940 is justified. At any rate, the area is to be served with a 4-

inch line to railhead at Oran, a project slated for completion in May. Material is on the ground for two 20,000-barrel tanks in the field and two of similar size at Oran.

Wildcats drilled during 1939 were considered to have added 333 acres to make the total proven acreage 44,284. In 1938 Argentina's proven ground was estimated to be 45,036 acres, delimiting wells in the provinces of Mendoza and Nequen having been responsible for the decrease in 1939. These figures, and others on Argentinean wildcats, will be found in a table compiled by private sources which accompanies this article.

Production Up

Argentina's production curve has trended upward for the past 3 years and it is expected to continue to do so during 1940 and possibly 1941. The 1938 production of 2,714,823 cubic meters, represented an increase of 4.41 percent, or 114,716 cubic meters, over the 2,600,107 barrels produced in 1937. Production in 1939 totaled 2,959,-168 cubic meters, an increase of 244,345 cubic meters, or 9 percent, over that of 1938. The 1938 increase was attributable solely to state-owned and operated properties, since production from pools belonging to private enterprises showed a decrease of 53,984 cubic meters, or 4.03 percent. However, in 1939 the private companies contributed 49,740 cubic meters to the increase and Yacimientos Petroliferos contributed 194,605 cubic meters.

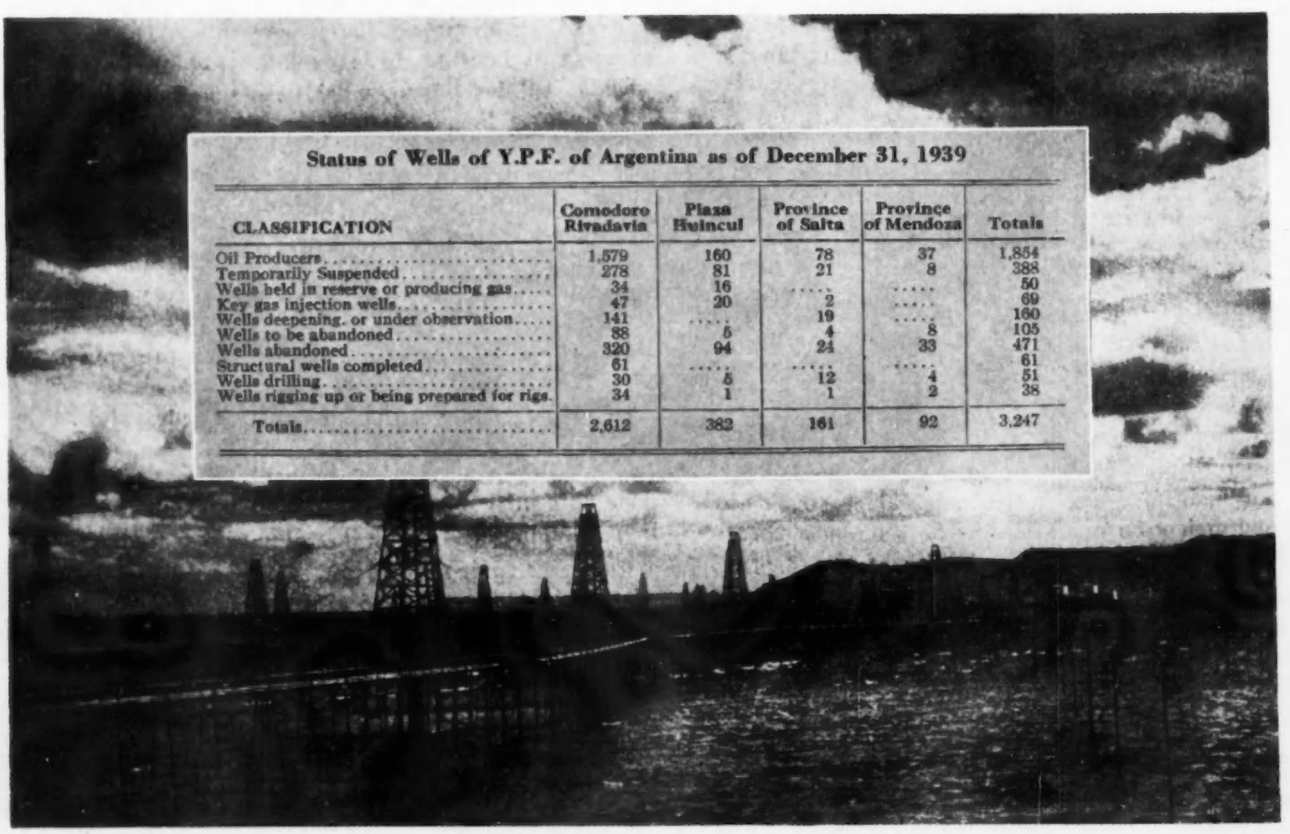
Villa explains that the proportion in which Y.P.F. and the private companies have contributed to complete the total Argentinian production has varied fundamentally from 1937 to 1939. He says (and the translation of his communication from Spanish to English is rather free): "Hence, for example, in the first years mentioned, Yacimientos Petroliferos Fiscales contributed 48.5 percent of the total, in 1938 it contributed 52.7 percent, and in 1939 the share of the state properties was 54.9 percent. The improvement obtained by the state exploitation between 1937 and 1939 represents 28.7 percent of its production, while the private companies' production diminished 4244 cubic meters, or .03 percent.

"With respect to exploitation by the state," Villa continues, "there have been various factors which have influenced the increment of its production. The principal of these with regard to volume of oil was found in the region of Comodoro Rivadavia, where the El Trebol and Manantiales Behr zones were put on production after delineating tests had been drilled. They contributed 247,259 cubic meters in 1939 as against 189,615 cubic meters in 1938, which is a good index to the rate of development."

The increase in production registered by the private companies in 1939 in Comodoro Rivadavia and Plaza Huincul regions was due exclusively to intensification of exploitation drilling in established zones. Private enterprise, Villa infers, has not expanded any of its producing properties in the past year; nor has it discovered any new sands.

It might be pertinent to remark parenthetically at this point that the trend of nationalization in Argentina during the past two years or more has been such as to decrease the likelihood of any major discoveries by private oil companies. Reports are that it is difficult for private enterprise to obtain concessions on which to do exploratory drilling and that the gap between the percentage of the nation's total production recovered

Offshore operations are not new to Argentina as shown by these pumping wells at Comodoro Rivadavia.



Status of Wells of Y.P.F. of Argentina as of December 31, 1939

CLASSIFICATION	Comodoro Rivadavia	Plaza Huincul	Province of Salta	Province of Mendoza	Totals
Oil Producers	1,579	160	78	37	1,854
Temporarily Suspended	278	81	21	8	388
Wells held in reserve or producing gas	34	16	.....	.....	50
Key gas injection wells	47	20	2	.....	69
Wells deepening, or under observation	141	.....	19	.....	160
Wells to be abandoned	88	5	4	8	105
Wells abandoned	320	94	24	33	471
Structural wells completed	61	.....	.....	.....	61
Wells drilling	30	5	12	4	51
Wells rigging up or being prepared for rigs	34	1	1	2	38
Totals	2,612	382	161	92	3,247

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ARGENTINA

Comparison of Drilling Operations, Proved Acreage and Daily Average Production (1938-1939)

Compiled from data furnished by private sources.

	1938				1939				Footage Drilled		Proved Acreage		Daily Average Production	
	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total	1938	1939	1938	1939	1938	1939
Salta														
San Pedro	7	..	..	7	..	..	..	...	5,621	.....	500	500	3,362	2,713
Lomitas	5	..	..	5	1	..	..	1	6,106	1,905	495	495	455	413
Agua Blanca	..	..	..	...	..	..	..	...	.....	3,546	91	91	211	214
Tranquitas	4	..	3	7	9	..	3	12	[1]	[1]	750	750	767	1,280
Rio Pescado	..	..	1	1	4	..	..	4	[1]	[1]	400	400	17	30
Other	1	..	..	1	..	..	1	1	38,627	54,790	161	171	58	36
Total Salta	17	..	4	21	14	..	4	18	50,354	60,241	2,397	2,407	4,870	4,686
Jujuy	..	..	1	1	..	..	2	2	6,235	[1]	.....	.....	.....	.....
Mendoza	8	..	5	13	4	..	1	5	[1]	[1]	3,190	2,152	551	2,.34
Neuquen														
Plaza Huincul	15	3	4	22	11	1	8	20	44,652	17,791[2]	2,876	2,458	2,705	3,559
Comodoro Rivadavia	219	3	64	286	177	6	64	247	535,705[3]	[1]	36,573	37,267	38,611	40,508
Total Argentina	259	6	78	343	206	7	79	292	[1]	[1]	45,036	44,284	46,737	50,987
Wildcats (Included in above total)														
Saladillo (Jujuy)	..	..	..	...	..	..	1[4]	1	[1]	[1]	.....	.....	.....	.....
El Quemado (Jujuy)	..	..	1	1	..	..	1	1	[1]	[1]	.....	.....	.....	.....
Pampa Amarilla (Mendoza)	..	..	1	1	..	..	..	...	[1]	[1]	.....	.....	.....	.....
San Carlos (Mendoza)	..	..	1	1	..	..	..	...	[1]	[1]	.....	.....	.....	.....
Lunlunta (Mendoza)	..	..	..	...	1[5]	..	..	1	[1]	[1]	.....	200	.....	.....
Ranquil Co. (Mendoza)	..	..	..	...	..	..	1[6]	1	[1]	[1]	.....	133	.....	.....
Total Wildcats	..	..	3	3	1	..	3	4	[1]	[1]	.....	333	.....	.....

[1] Unavailable. [2] Private enterprise only. [3] Y.P.F. only. [4] Abd. due to drilling difficulties at 2558 feet. [5] 300 b/d at 7428 ft. (Lunlunta No. 3). [6] Abd. at 1141 ft. (Ranquil Co. No. 1).

by oil companies and that recovered by the Yacimientos Petroliferos Fiscales will grow wider.

Field results show the completion of 320 wells in 1939 as against 304 in 1938, with Comodoro Rivadavia furnishing the bulk of completions both years. In addition, 16 deepening projects were completed in 1939, as against 45 in 1938. The Y.P.F.'s share of the 1938 completions was 194; its share of the 1939 completions was 165.

Argentina had completed a total of 4821 wells up to the end of 1939, of which 3158 were government projects and 1663 were drilled by oil companies. Almost five sixths of the country's wells have been completed in Comodoro Rivadavia district, which undoubtedly will continue to lead in field development for some time, although drilling along the Tupungato syncline may be expected to show a material increase.

Whether completions in 1940 will exceed those of 1939 is problematical, but, the year began with 51 wells drilling and 38 additional ones rigging up or preparing the locations to receive rigs. If the two years, 1938 and 1939, can be taken as yardsticks, the trend seems to be for fewer deepening projects in established fields as only 16 of this type of project were listed among the 1939 completions as against 45 the year previous.

On the basis of those areas in the Province of Salta on which footage figures are available, drilling was up in 1939, the figures being 60,241 feet for that year against 50,354 feet in 1938. Detailed comparisons may be made on other areas by referring to the final table, but it is interesting to note here that Lomitas Agua Blanca were definitely on the decline from the standpoint of footage. Complete figures were not available on Plaza Huincul for 1939, but private enterprise drilled 17,791 feet there during 1939 as against a total of 44,652 feet for company and government drilling during 1938. An estimate of the total footage for Plaza Huincul for 1939 might be calculated roughly on the basis that government completions for the nation for all time have totaled 3158 against 1663 for private companies. Footage figures are not complete on Comodoro Rivadavia either, and this district accounts for about five sixths of the country's total completions. In 1938, however, drilling in Comodoro Rivadavia totaled 535,705 feet for government wells only.

Producing well in the San Pedro field, Argentina, completed for an initial production of 276 barrels.

Gas injection is being resorted to in three of the country's four main producing districts, as Comodoro Rivadavia lists 47 gas injection wells, Plaza Huincul, 20, and the Province of Salta, 2. These figures refer only to wells belonging to Yacimientos Petroliferos Fiscales.

While Argentina's refinery capacity is sufficient to take care of most of the domestic demand for refined products, it continues necessary to import part of the crude run through the refineries. Hence, domestic production of crude will be stepped up just as fast as possible.

Building good roads, like the above leading to Quiriquire, represents part of the cost of staying in the oil business in Venezuela.

Disruption of Venezuelan Drilling Threatened

DISRUPTION of a large and comprehensive drilling program in Venezuela loomed as a strong possibility early in March because of rulings of the Department of Fomento (Industry), and while the matter was temporarily handled through the action of the Department of Finance in allowing passage through customs of certain equipment, pending settlement of contested points, there still remains the possibility that Venezuelan operations may be seriously retarded unless the points in conflict are definitely settled.

Two Questions Involved

Two major questions are involved. One, which has been pending since October, 1936, has to do with the importation, duty free, for use on concessions granted prior to the 1936 Petroleum Law, of certain equipment and supplies. The other has to do with a recent Regulation of the Department of Fomento which, in addition to further complicating the matter of the importation of materials, seeks to impose a rule requiring the oil companies to secure permits to drill.

Both of these questions also arose in 1930, but after prolonged discussions with the then Minister of Fomento, Dr. Torres, now comptroller general of the nation, they were decided in favor of the oil companies.

To understand the situation it should be remembered that in Venezuela the federal government has always exercised the right of ownership of minerals, including oil, and that leases or contracts with oil companies to develop such minerals, including oil, known as "concessions," must be made by the government.

Exemption Limitation

Almost all of the concessions (contracts) in force in Venezuela have been made under laws passed prior to 1936, which laws contained identical provisions specifically exempting from importation duties all instruments, apparatus, machinery and their spare parts, etc., which the concession holders *"may destine* to their works of exploitation, exploitation, refining and transportation, *and in general, all the effects and equipment which they might import for the works* which they have the right or the obligation to undertake." In 1936, however, a law

Side lines, such as this hollow tile plant, have been nurtured for Venezuelan posterity by petroleum concessionaires.

A contribution to the spiritual culture of the oil field community, erected by Standard Oil Company of Venezuela.

was passed containing a provision limiting the exemption from duty to materials which the concession holders "might *have* to import, on account of being *necessary and not produced or manufactured* in the country, for the works which they have the right or obligation to undertake." And the 1938 Law still further limited this exemption to such materials and equipment as the Minister of Fomento, *at his option* may determine. But in both the 1936 and 1938 laws it is specifically stated that concessions made under prior laws will continue to be interpreted and enforced in accordance with the provisions of such prior laws.

Minimum Royalties Prescribed

The concessions made prior to 1936 called for a minimum 10 percent royalty (figured on value at port of embarkation) to be paid to the Venezuelan government, except in instances where they were granted to land owners on their own properties, in which case the royalty was reduced to 7½ percent.

However, there was a provision in all such concessions to the effect that the royalty payments could not be less than 1½ bolivares (now 48 cents in U. S. money) per metric ton on oil produced from the 7½ percent concessions or less than two bolivares (64 cents in U. S. money) per ton on the 10 percent concessions. These minimum royalty payments amount, respectively, to approximately 7½ cents and 10 cents per barrel.

In addition to the above royalty, the concessions provided that a surface rental ranging from two bolivares to five bolivares per hectare per year should be paid the government on land selected for exploitation purposes.

In the case of "National Reserves," referred to later in this discussion, royalty was set at not less than 15 percent and in concessions granted under the 1936 and 1938 laws the royalties varied from 12½ to 15 percent and, in addition thereto, substantial bonuses were paid to the government.

Two Types of Contracts

Oil companies when entering into concession contracts with the government may make use either of the "exploration" type of contract, which involves selection of half of the block covered, as explained later, or can take out a straight "exploitation" or development lease and hold the entire block. This costs more in surface rentals paid to the government, although it may save a company considerable expense in the long run if it turns out to be productive. Under the "exploration" type of concession, oil companies when entering into contracts with the government are allowed three years for "exploration" or geological-geophysical study of the property, after which time the company may select one half of the acreage, or "hectarage," covered by the concession, the remaining half reverting to the government in what is termed "National Reserves," and the government must advertise such acreage and dispose of a concession on it to the highest bidder.

Thus, despite the idea prevalent in the United States that vast domains of land may be held without cost indefinitely, a company may decide that an area covered by the original concession is very desirable land, and then, after having spent its own money in "exploration," find that it is forced to bid against a competitor for half the land.

Sliding Rentals

After the parcels to be covered by the concession have been selected by a company, it must pay to the government an initial or nonrecurrent tax of two bolivares per hectare, then pay rent at the rate of two bolivares per hectare per year for the first three years, four bolivares per hectare per year for the next 27 years and five bolivares per hectare per year for the remaining 10 years.

The concessions run 40 years from time of selection of the exploitation parcels, and at their expiration all of the properties and equipment on them revert to the government.

In addition to the foregoing, arrangement must be made by the concession holder with the private owner who owns or claims the surface rights. Such arrangements must compensate him for damages, if any, for use of the surface hectarage and if roads are to be built to the wells—necessary in practically every instance away from Lake Maracaibo—the owner must be compensated for the destruction of trees, and these cannot be cut without a government permit. Possible complications can arise, but in the event that the owner of surface rights is unreasonable, the companies have recourse to the courts under a law of eminent domain. There have been few instances where such recourse has been necessary.

Yield From Rentals

To give an idea as to the extent of the rentals paid to the government, the report of the Minister of Fomento made in February last

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Write for Bulletin No. 149

5 WHELAND-LUCEY FEATURES

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3. Pinion horizontally adjustable while Rotary is running, reduces gear noise to minimum.
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year showed that oil companies were paying rentals on a total of 6,296,375 hectares.

It is estimated that the money yield on surface rentals alone in Venezuela now amounts to at least 25,000,000 bolivares per year.

Payments of royalty and of rental are made by the oil companies directly into the treasury of the Republic and in 1938 amounted to more than 95,000,000 bolivares (a bolivar is worth approximately 32 cents, U. S. money), and it is estimated that the revenues from such royalty and rentals in 1939 were in excess of 100,000,000 bolivares, out of a total governmental revenue from all sources of around 340,000,000 to 350,000,000 bolivares, or more than 30 percent.

The concessions granted prior to 1936 and which are governed by such prior laws not only give the companies the right to prospect for, drill, produce, transport and refine oil, but, as already stated, also explicitly give them the right to import, duty free, all materials and equipment "destined" for use in operating such concessions. Such duty-exempt items include drilling equipment, automobiles used in oil work, materials for camp construction, etc. Exemptions have not been sought on imported food, furniture, etc., very large items of expense to the oil companies.

Wildcatting Costly

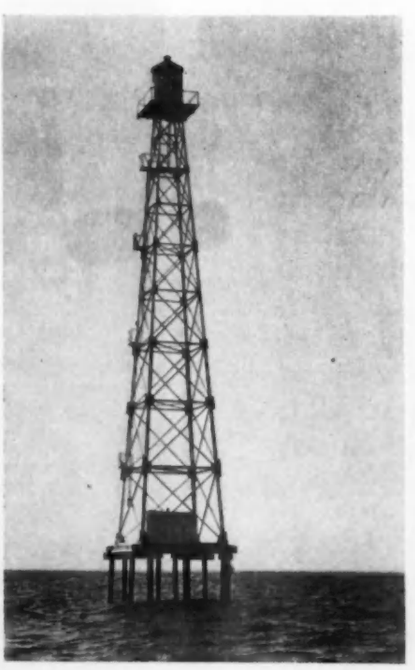
A great many people have in some manner conceived the idea that a company seeks out a likely spot in a jungle where oil is already bubbling out of an oil seep, drills a shallow well and isn't in the social register unless it gets a 10,000 to 100,000 barrel well, the oil from which is quickly loaded into a tanker, with the result that the company is richer and the country is poorer by the operation!

But a visitor from the United States is immediately struck by the realization that operations in Venezuela are likely to prove a costly procedure.

They are so vastly different from operations in the states that an account of what they constitute should be interesting—and this difference in operations also makes up a material part of the controversy now under way between the government and the oil companies, because even in Venezuela there are some who do not understand all that can be learned about oil development.

Must Build Roads

To begin with, operations in many parts of Venezuela—in fact, every part excepting at Lake Maracaibo—call for road building on a large scale. And road building in the tropics is no mean undertaking. A 100-mile road paralleling its pipe line is now being built from scratch in Eastern Venezuela by Mene Grande Oil Company. When completed it will be as fine a highway as one could desire, with concrete bridges, asphaltic topping, proper drainage, etc., all installed at a cost to the company of more than $4,000,000. In other areas less pretentious roads still call for a great deal of money. In the Quiriquire field, also in Eastern Venezuela, more than 30 miles of roads built by Standard Oil Company of Venezuela are all topped and must be kept in perfect condition. Incidentally, it should be added that the Mene Grande Oil Company road just referred to constitutes what will be one of the principal highways of the Republic and is open to the public although it is being built and paid for by the company. It is the only road affording access from the northeast coast to the Orinoco River valley and the vast llanos (plains) in that region.



Erection and maintenance of aids to coastwise and inland navigation sometimes enter the "incidental" cost of concession development.

Expensive Camps

Also, camps must be constructed. Of course, there are some "camps" in the United States, and both in the states and in Venezuela the word camp is a real misnomer. Actually these "camps" in Venezuela are fair sized towns or even cities. The houses are of permanent construction, either of wood with proper protection against termites, or of hollow clay tile manufactured by the oil company near the townsite, or of steel with stucco coating, or stone. Public utilities must be provided in most instances, sewerage must be disposed of and mess halls and commissaries maintained. Employees, both Venezuelan and foreign, must be made to feel perfectly at home, and the homes for the Venezuelan families far outnumber those for the foreign staffs. Ratio of Venezuelan to foreign employees is about 90 percent Venezuelan, 10 percent foreign.

While the wildcat camps located near the exploratory wells are not of the character of those established after production is secured, they are, nevertheless, comfortable, clean and sanitary.

Hospitalization is another highly important part of an oil company's operations in Venezuela. One oil company has spent more than a million dollars on its hospitals in the Republic and they will compare most favorably with public or endowed hospitals of towns of 25,000 to 100,000 in the states.

Extraneous Costs Large

These expenses, ordinarily extraneous to operations in the USA, are necessary because of the virgin nature of the country in which oil is produced. Roads, camps, hospitals, must start from the jungle or llano up. They are an absolute necessity in order to maintain employees on the job and keep them healthy and efficient.

Summing the matter up, a visitor is immediately struck with the tremendous expense incidental to the operation of oil properties, in addition to the actual drilling. In other words, equipment and supplies intended for oil development must necessarily include more than simply drilling rigs. The Venezuelan government recognized this condition when the first concessions were granted. It realized that most of the equipment and supplies

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which would be used would have to be imported. Venezuelan duties have always been high, and it is doubtful in the extreme if the oil companies would have come into the country in the beginning if the government had not pledged itself in its laws and the concession contracts made thereunder to admit duty free, or as it is called in Venezuela, "exonerate" from duties, equipment and supplies intended for oil development.

Of late there has been some suggestion in the Venezuelan press that it would probably be better for the government to forego the collection of oil royalty and instead collect duties on materials imported by the oil companies, but this suggestion ignores the fact that the companies would probably not have come into the country—at least not on a large scale—if it had not been for the equitable provisions of the Venezuelan Petroleum Laws (including their exoneration provisions) passed prior to 1936.

Court Decisions

As above stated, in spite of the question of exoneration of duty on materials being fully discussed and settled in favor of the companies in 1930, the Department of Fomento, after passage of the 1936 Law again raised the question and has ever since been attempting to deny exoneration on a large amount of supplies and equipment imported by the companies. At first the Minister limited his denials to such materials as lumber, nails, corrugated roofing, etc., on the ground that they were "produced or manufactured in the country," but later included in his denials such equipment as cars for toolpushers saying they were not "indispensable" for oil operations on the theory, it must be presumed, that toolpushers could ride burros to their work. The list of materials on which exoneration was denied grew to *include all spare parts* of every description with the sole exception of those used on drilling rigs, all refrigerating equipment—even that used for cooling water or for conserving food and it came to the point where all the operating oil companies filed suit in the Supreme Court to protect their rights and in each one of the four cases so far decided the court held that under the terms of the laws governing the concessions under which the companies were operating, if the materials in question were *destined* for use in oil operations, they should be admitted duty free without the necessity of showing their *indispensability* for such operations.

However, the Minister of Fomento continued to deny exoneration on the same class of materials involved in these various court decisions and on numerous occasions protests were lodged with him and with the Minister of Finance, who attends to the collection of duties, calling their attention to the fact that they were ignoring their own Supreme Court decisions, in which decisions it was clearly held that the *destination* of the materials for the oil operations and not their being produced or manufactured in the country or their being indispensable, was the determining factor as to whether or not they are exonerable under the laws prior to 1936 which govern the concessions involved. The court in its opinions had evidently realized that if the indispensability or even the *necessity* were the controlling factor, there could be easily a constant state of controversy as to what was necessary and what unnecessary.

Delayed Action

Under the Venezuelan Customs Law, in order to receive materials which are exempt from duty the oil companies must post bond with the customs collector guaranteeing that within 90 days of the receipt of the materials they will present to the Customs Collector the corresponding exoneration issued by the Minister of Fomento.

Frequently the date for the forfeiture of the bond is up with no action from the Department of Fomento. This naturally affects bond coverage which the companies try to maintain with the customs. Last week it had the effect of holding up for several days urgently needed drilling rigs which were on the docks.

The situation definitely is interfering with a drilling program in several states of the Republic.

Permits Demanded

As above stated the matter of the oil companies having to secure drilling permits also arose in 1930, but was settled then without going to the courts, the government at that time agreeing that since the laws under which the concessions were granted did not require a permit to drill, the regulation could not require it. However, the oil companies are again being told in a recent regulation that they must seek drilling permits before starting to drill wells. They contend that they should not have to ask for the right to do something which their contracts with the government and the laws governing such contracts clearly secure to them. It has been their practice to advise the government as to wells being drilled, their location, etc., and they are continuing to do so.

From the foregoing it might be thought that there is a definite plan on the part of the Venezuelan government looking towards unhappy times for the oil companies there, but this is not necessarily the case.

Contreras' Position

President Lopez Contreras appears to hold the highest admiration, not only of the Venezuelan people, but of the oil companies and their employees as well. He has on more than one occasion made it clear that Venezuela has no need to seek Marxist doctrines when she has available and well known to all of her people the political thinkings and teachings of her Liberator, Simon Bolivar, hero of all of the Americas and a staunch believer in democracy with strong central power.

That the matters in controversy between the oil companies and the government will be satisfactorily adjusted, even if the courts must be resorted to, time and time again, to prevail on the Minister of Fomento to comply with previous decisions, does not permit of doubt. But the controversies are holding up development which should be under way. In the great area lying between the Caribbean Sea and the Orinoco River, a large wildcat program is under way as well as development of proven areas in some of the fields recently discovered. A pipe line, the longest of its size (16-inch) in the world, has been built to serve this area. Drilling is deep, and difficult, with all of the problems attending high-pressure deep drilling elsewhere, and to complicate it with delays in securing needed equipment is adding nothing to the peace of mind of those in charge of operations.

Whether or not this area will ever rival the Lake Maracaibo section in production remains to be seen. That operations in this area, which includes more than a half score of proven fields discovered to date, will cost a great deal more than operations cost elsewhere in the republic seems to be a foregone conclusion.

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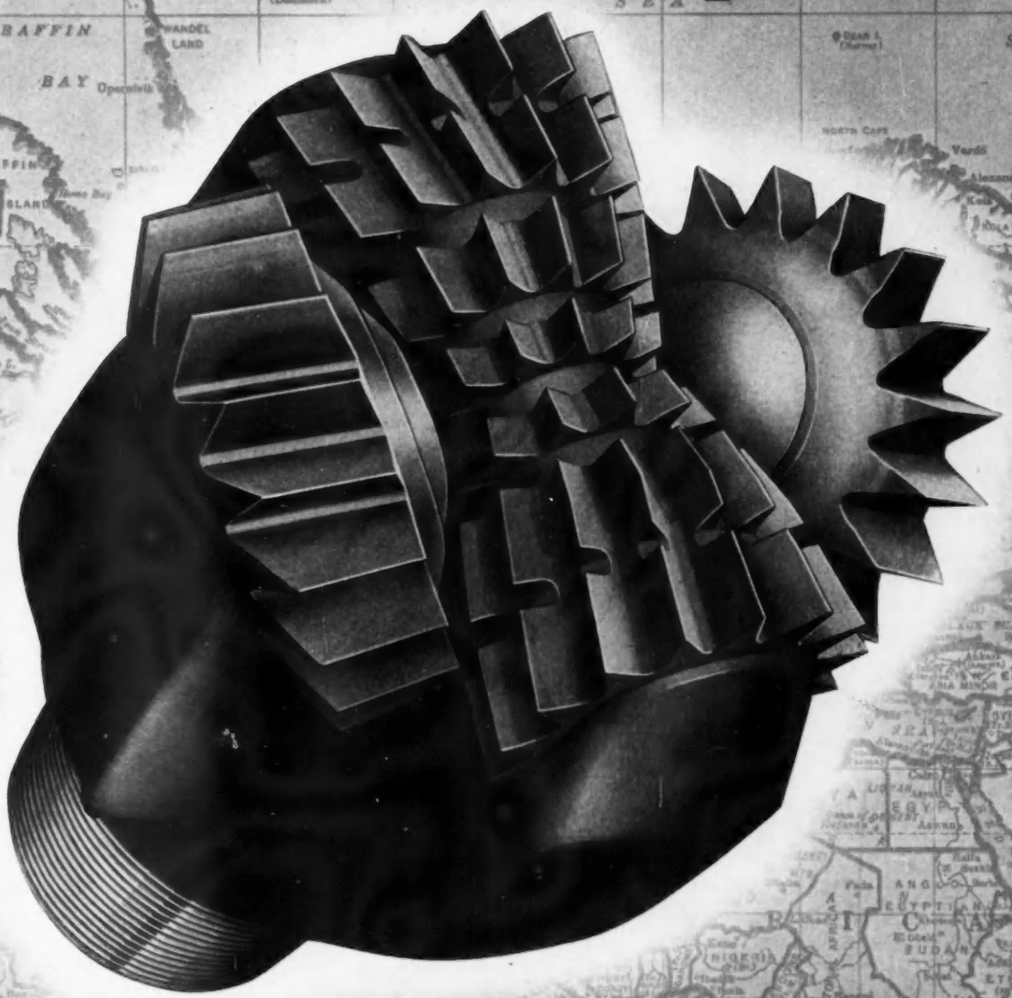

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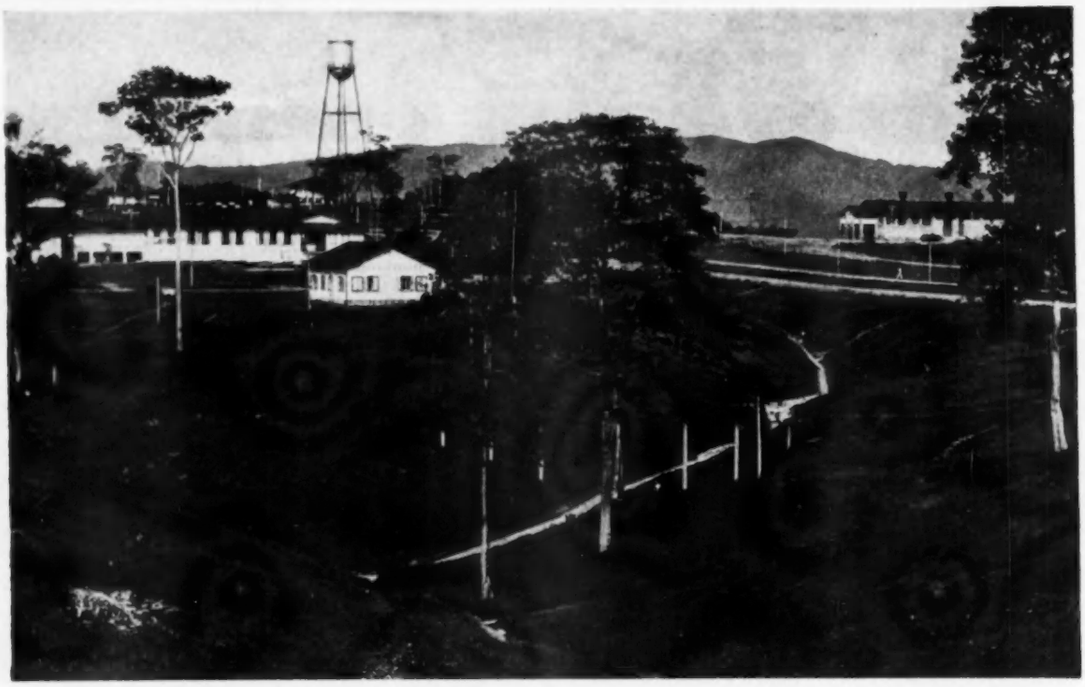

Some of the healthiest, most beautiful communities in Venezuela are those that have been built by the oil companies for their workers. This is a section of Standard Oil Company of Venezuela's Caripito camp in Eastern Venezuela.

Venezuela to Maintain Important Rank

Country is still a major source of supply despite downward trend in field operations

VENEZUELA, having established the right to challenge Russia as the world's second largest producer of crude oil, will continue to provide a major source of crude and refined oil products and new operating techniques for years to come. She will rival California and the Texas Gulf Coast as a proving ground for new methods and equipment before many years, for the trend definitely is toward deeper drilling and its attendant reward, higher gravity oil.

An industry born there under the sound, firm regime of late President Gomez, will, because of the nature of the corporations carrying on and because of the nature of lease or property holdings, continue to be operated along the lines best calculated to result in utilization of sound engineering principles directed at conservation of the national resource to the mutual advantage of the business and the people of the land.

Definite hope that the political zeal and a misguided opinion as to what constitutes sound national economy which has wrecked the oil industry in Bolivia and Mexico will never be foisted upon the Venezuelan citizen is found in a late statement of the chief executive, President Eleazar Lopez Contreras, who declared:

"Venezuela will never confiscate oil-company properties."

The president amplified the statement with another to the effect that Mexico had made a great mistake in its policy of expropriation.

A study of the past year's accomplishments in Venezuela and a consideration of current activities permits something of a peep into the future, which is given in the following paragraphs:

Production To Be Down

Even with the flurry of exploratory work current in Eastern Venezuela, it is doubtful whether the country will go on record as producing as much oil in 1940 as it did in 1939, when an all-time peak recovery of 207,952,076 barrels was registered to show a gain of 17,479,709 barrels, or better than 9 percent, over the 190,472,367 barrels produced in 1938.

The excess of 1939 production over that of 1938 comes closer to reflecting an accurate picture of Venezuela's potentiality as a crude producer than does the outlook for less production in 1940, for the dimmer outlook is strictly the product of the exigencies of international economics influencing world petroleum marts and does not reflect in any sense a weakening in the ability of Venezuela as a producer. If the expected curtailment of output in 1940 is realized, it will be because the business acumen of those in control has so dictated and not because of exhaustion of reserves.

And speaking of Venezuelan reserves, Eugene Holman, president of Creole Petroleum Corporation, which has vast interests in that

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VENEZUELA
Summary of Production and Wells

	1938		1939		Total to End of 1939	WELL DATA AS OF DECEMBER 31, 1939							Wells Completed Year 1939
	Total Production	Daily Average	Total Production	Daily Average		Wells Drilling	Nat. Flow	Gas/Air Lift	Pumping	Closed In	Inactive	Abandoned	Total Wells Drilled	
Ambrosia	1,210,546	3,317	1,010,609	2,769	27,635,549	..	...	...	79	1	31	18	129	3
La Rosa	16,778,660	45,969	15,775,673	43,221	298,796,736	..	109	13	499	49	240	49	959	...
Benitez	8,163,690	22,366	8,146,083	22,318	39,501,428	..	72	14	19	15	48	6	174	22
Tia Juana	43,699,954	119,726	49,399,719	135,342	119,657,182	6	108	4	188	194	8	1	503	67
Lagunillas	67,077,040	183,773	71,926,356	197,058	892,266,858	2	104	31	605	387	158	36	1,321	150
Bachaquero	986,799	2,703	3,473,708	9,517	4,535,289	..	6	...	....	22	12	2	42	7
Total Lake Fields	137,916,689	377,854	149,732,148	410,225	1,382,393,042	8	399	62	1,390	668	497	112	3,128	249
La Paz & Concepcion	1,822,521	4,993	1,460,637	4,002	26,438,181	1	4	...	74	29	25	5	137	2
Tarra & Los Manuels	5,236,872	14,348	5,582,001	15,293	56,241,885	2	17	...	47	17	27	15	123	10
Mene Grande	12,506,006	34,263	12,464,700	34,150	210,482,343	3	36	15	35	170	134	16	406	34
El Mene & Media	543,178	1,488	425,297	1,165	24,280,851	..	...	40	32	....	108	144	324	...
Cumarebo	2,596,801	7,115	2,667,434	7,308	24,522,412	..	46	2	11	23	21	14	117	5
Quiriquire	25,208,271	69,064	26,581,672	72,826	150,577,521	..	116	3	31	122	9	15	296	14
Pedernales	1,914,533	5,245	1,904,983	5,219	5,382,254	..	10	...	....	4	1	4	19	...
Temblador	2,305,089	6,315	3,664,093	10,039	6,047,251	1	58	...	....	18	5	15	96	32
Oficina	174,977	479	2,350,669	6,440	2,542,619	6	31	...	....	3	3	2	39	35
Jusepin	.....	.....	476,132	1,304	516,116	6	19	...	....	1	...	1	21	20
Others	247,430	678	642,310	1,761	4,651,976	8	10	...	4	44	19	127	204	14
Total Venezuela	190,472,367	521,842	207,952,076	569,732	1,894,076,451	35	746	122	1,624	1,099	849	470	4,910	415

country, is reputed to have told stockholders in 1939: "We have plenty of reserves to support our present market, or any increase in the market we may see in the reasonable future—in the next 5 or 10 years. Frankly, reserves have ceased to be a problem to us."

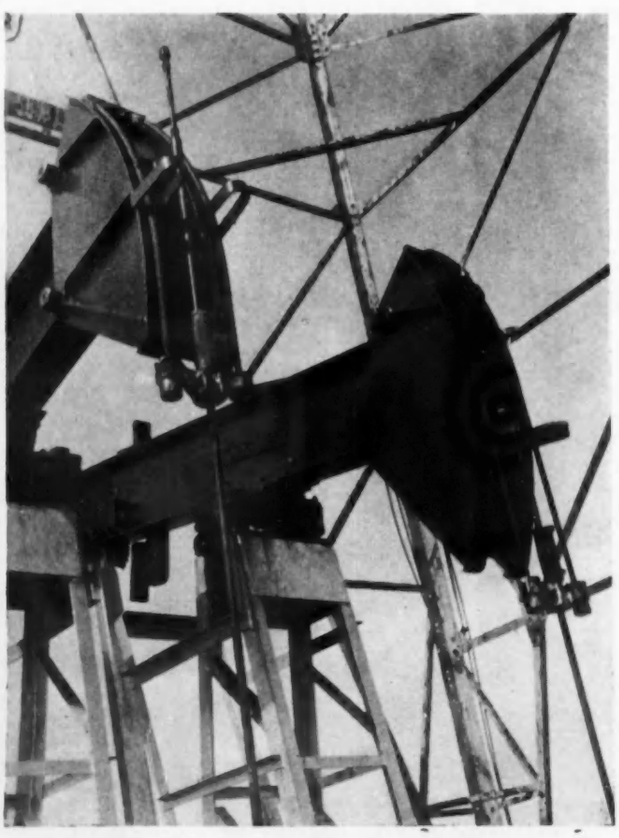
Explanation of Forecast

An explanation of the forecast for lower Venezuelan production in 1940 is in order. Take, for example, the Mene Grande Oil Company, which operates in the Bolivar district fields around Lake Maracaibo as well as in Eastern Venezuela. The supply of stocks on hand at this company's Las Piedras refinery were reputed to be exceptionally heavy as 1940 got into swing. Production of the company, which had averaged about 75,000 barrels per day during the first half of 1939, dropped to 56,000 barrels in December and was expected to be held below the latter figure for the first months of 1940.

Further explaining the forecast, Lago Petroleum Corporation's recovery averaged about 200,000 barrels daily during the third quarter of 1939 and then soared to 250,000 barrels during October, presumably in anticipation of unusual demand. But during December this organization's output had been beaned down to 200,000 barrels again with Bolivar district crystal gazers, a goodly lot of which are on Lago's pay roll, envisioning an average of around 175,000 barrels daily for the company for the first quarter of 1940 at least.

Looking at the case of Venezuelan Oil Concessions, the second largest producer in Venezuela, an almost parallel prognostication will fit. During most of 1939 this company averaged around 175,000 barrels production per day. Information from a long-time resident of Maracaibo is that the runs will be cut severely in 1940, possibly to as little as 115,000 barrels per day.

In analyzing the production outlook, when one has studied the foregoing three companies and their affiliates, he may be said to have eaten enough of the whole pie to know what it tastes like, for production by other companies in Venezuela, comparatively speaking, is of relatively minor importance.



Multiple sand production is common in Venezuela. They drill to one sand, tilt the derrick over, and start a hole for another sand six feet away.

Policy Valuable

All in all, the expected curtailment of output will be worth millions of dollars in the long run to

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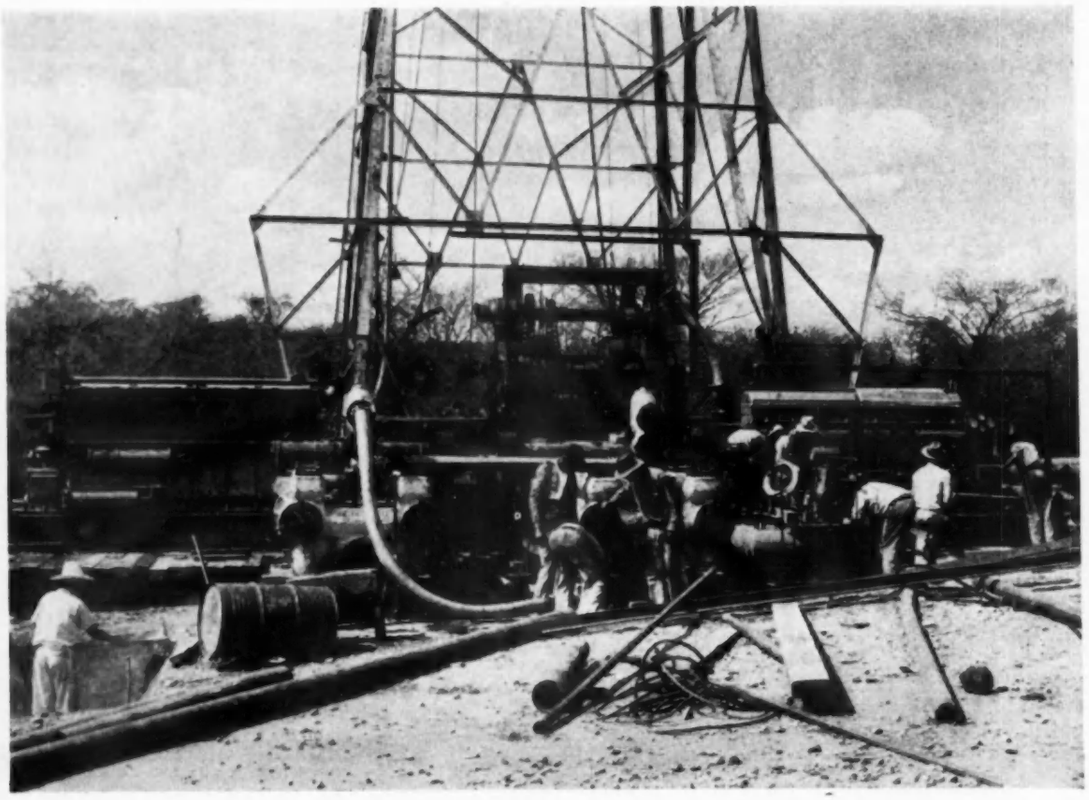

Busy scene at Guarico Oilfields' Guayabo 1, important Venezuelan exploratory test.

the Venezuelan government and people. It will allow the application of certain reservoir energy conserving engineering practices not economically practicable previously. Those familiar with the basic scientific principles involved in the conservation of national resources will recognize this at once as an attendant asset to the expected program. Those interested more in royalties and other forms of revenue will realize that fulfillment of the expected program will tend to stalemate a state of affairs which would force the producers and vendors of Venezuelan crude from dumping it on the market at distress prices.

Drilling To Be Down

Total completions in Venezuela dropped from 521 in 1938 to 415 in 1939, despite the fact that production showed an increase. Now while Eastern Venezuela is absolutely unpredictable, because of new reserves being opened up there from time to time, Western Venezuela, which still contributes substantially more than half of the country's output, has scheduled a program which means that Venezuelan drilling definitely will be down in 1940.

Fields of the Bolivar district along the shore of Lake Maracaibo, including Ambrosio, La Rosa, Benitez, Tia Juana, Lagunillas and Bachaquero, completed 249 wells in 1939, or 60 percent of the country's total. They yielded 149,732,148 barrels during the year, or 71 percent of the total for Venezuela. So that using them for a yard stick, and admitting the unpredictability of Eastern Venezuela, one may get some idea of what to expect for 1940.

The three aforementioned oil companies have always done practically all the drilling in the district, and they plan, according to word from Maracaibo, to curtail operations drastically. Mene Grande Oil Company is understood planning to drill only a few wells in Bachaquero and shut them in for reserve. It has closed offices in Lagunillas and moved the employes to Cabimas. Lago Petroleum Company's lakeshore drilling program for 1940 is said to have called for only 10 wells, four of which had already been completed by March 1. In 1939 this organization chalked up 93 completions, plus a deep wildcat in Trujillo. Venezuelan Oil Concessions was rumored planning to reduce drilling severely in 1940, possibly to 30 completions in Lagunillas and Tia Juana. It will keep one string of tools busy at Cabimas. As to Caribbean Petroleum Company, V. O. C. affiliate operating at Mene Grande, it is said the drilling department will merely attempt to maintain production at the 24,000 barrels per day required to charge the San Lorenzo refinery. Mene Grande field averaged 34,150 barrels per day during 1939.

Eastern Venezuela

Of the 166 wells completed outside the lake district in Venezuela during 1939, the three relatively new fields in Eastern Venezuela, Temblador, Oficina and Jusepin, accounted for 87, or slightly over 50 percent, whereas their production represented a much smaller percentage (6,490,894 barrels) of the 58,019,928 barrels produced outside the lake district last year.

As to the outlook for some of the miscellaneous fields of Venezuela, it is doubtful if Tarra and Los Manueles together will equal the 10 wells completed in them in 1939. Mene Grande is most certainly not likely to equal the 34 completions accredited it last year. There is nothing on the horizon or in the bag to warrant hopes of Cumarebo or Quiriquire exceeding the 5 or 14 completions, respective-

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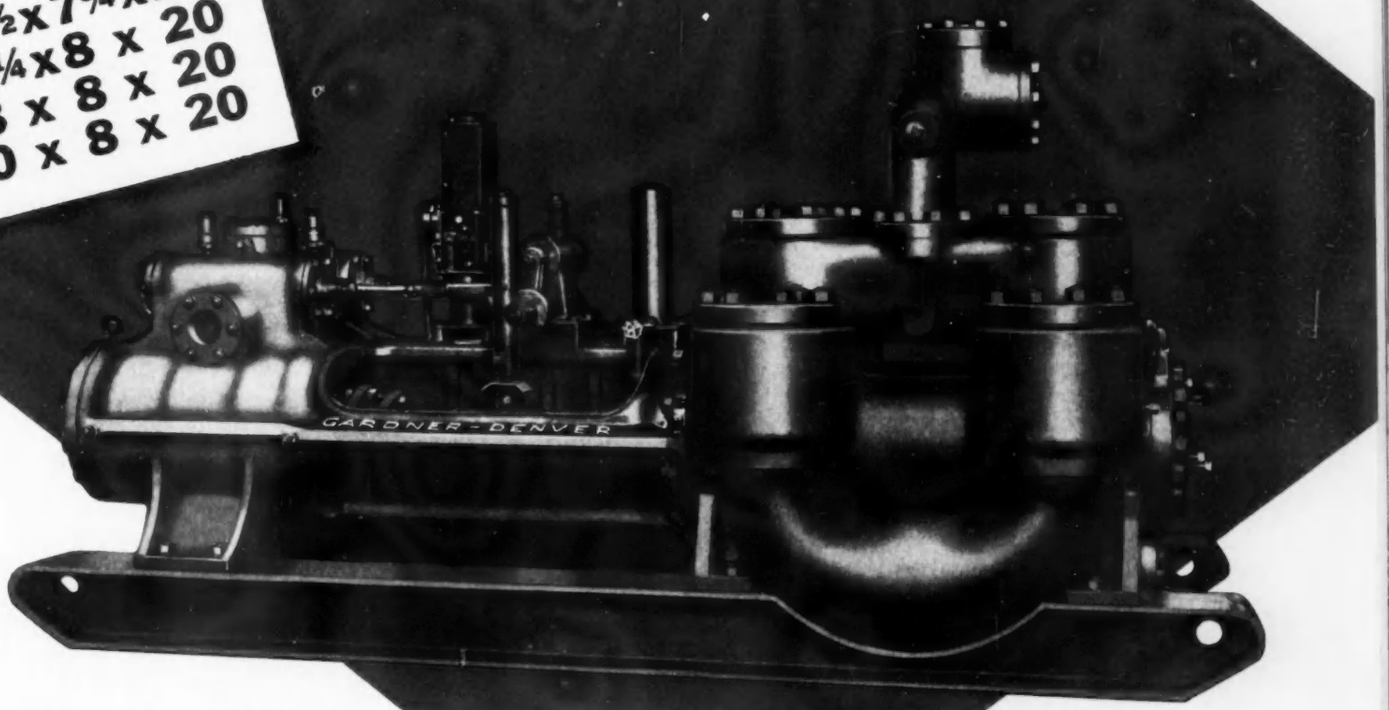

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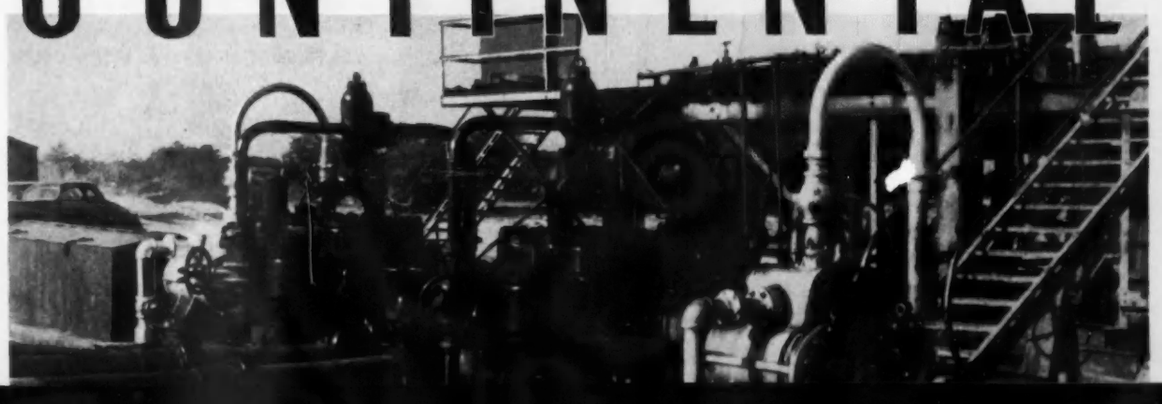


ly, recorded by them last year. But, Oficina and Jusepin may exceed the 35 and 20 completion, respectively, chalked up during 1939.

One new spot in Eastern Venezuela promises considerable drilling. This is the El Roble area being developed on Pantepec Petroleum Company concession holdings by Standard Oil Company of Venezuela.

El Roble Looks Good

A wire to THE OIL WEEKLY March 8 from W. F. Buckley, president of Pantepec stated: "On February 21 El Roble 2 is believed to have encountered at 9931 feet, the same oil sand encountered in El Roble 1 at 9553 feet. There were good oil and gas shows in this sand. An electrical test was made and 7-inch casing set. The well drilled on March 6 to 9942 feet and was being cored. No report since then."

A previous cablegram revealed a sand in El Roble 2 at 8315-55 indicated El Roble field to be 2¾ miles long. El Roble 1, southeast, encountered 8 oil bearing sands with a total thickness of 239 feet between the 8200- and the 9600-foot levels. It was completed for 800 barrels of 44-gravity crude through ⅜-inch choke.

Although it is locally estimated that developments thus far in this northern Anzoategui field have established an area of 10,000 proven acres, the wells are located on a concession embracing 35,601 acres in a locality 140 miles northwest of Tabasco field.

Construction of 8 miles of lateral line will be necessary to tie El Roble production in with the new 96-mile, 16-inch line running from Oficina to Guanta on Caribbean tidewater.

Oficina and Jusepin

Mene Grande Oil Company's new Oficina field, previously mentioned as having completed 35 wells last year, will be one of the busy drilling spots of Eastern Venezuela during 1940. Gravity of oil produced there ranges from 17.5 to 44 and the average completion is capable of about 2000 barrels initially.

Standard Oil Company of Venezuela's relatively new field at Jusepin, 20 miles west of Maturin and in the State of Monagas, probably will complete at least 20 wells in 1940. The field is classed as a 33-gravity producer, whereas the discovery well initialed 750 barrels of only 30-gravity oil from about 4900 feet.

Drilling and production statistics on Venezuelan fields will be found in the accompanying table.

Despite the statement by Luis Herrera Figueredo, in the technical service of petroleum inspector general at Caracas, numerous explorations and exploitations had been cancelled by the government during 1939 for failure to drill or pay taxes, exploratory drilling continues actively in several parts of Venezuela.

Wildcatting Active

In the State of Guarico, about in the center of the country, Guarico Oilfields (Venezuela) Limited, Caracas Petroleum Company, Socony-Vacuum Oil Company, The Texas Company, Mene Grande Oil Company and Standard Oil Company of Venezuela are continuing exploratory efforts.

During 1939 the first two of the above mentioned companies drilled three wells in the vicinity of Las Mercedes, where prospects are classed as good enough to continue the search in 1940. It is also possible that Mene Grande Oil Company will drill a couple of wildcats in 1940 near Tres Matas, Parcel 674, near the Guayabo wildcats drilled by Guarico Oilfields.

Typical road through the "monte" to a field in Eastern Venezuela prior to development of production.

Dr. Basilio Gil, geologist in charge of the Maracaibo office of Compania Espanola de Petroleos, S. A., stated recently the company probably would resume drilling in 1940 on pooled acreage in the District of Maturin, State of Monagas. The actual drilling will be done by Standard Oil Company of Venezuela, which has already drilled four failures in the neighborhood. One of them had enough kick, however, to blow out at 9119 feet.

The Texas Company definitely is interested in obtaining production in Anzoategui and Guarico states. Rumors that the company is trying to obtain from Ultramar Exploration Company an interest in concessions in these two states probably are true. James Terry Duce and Fred Sealy of New York, executives of The Texas Company concerned with development of foreign production, flew to Venezuela the latter part of February. The Ultramar properties extend roughly from Aragua de Barcelona through El Chaparro and Santa Maria de Ipire.

Recent concession map changes call for putting the "Anzo 325" concession in the Municipality of San Diego de Cabrutica, District of Monagas, State of Anzoategui, in the color of Socony-Vacuum Oil Company as it has received title to same. Likewise, Venezuelan Oil Development Company, an affiliate of Caribbean Petroleum Company, largest operating subsidiary of Venezuelan Oil Concessions, has been awarded the concession "Mat," Municipality of San Rafael, District of Mara, State of Zulia.

That concession maps will call for more changes and additions seems evident from the heavy amount of geological and geophysical working going on throughout the country, particularly in Eastern Venezuela where the prospects are said to be numerous. That some of the recent finds have turned out to be disappointments when subjected to drilling will not have too dampening an effect on the searchers.

Monte Oscuro Will Highlight Colombian Developments

MOST of Colombia's interest in exploratory efforts during the first half of 1940 probably will center around the Monte Oscuro anticline, where Compania Petroleo Shell de Colombia has started a second wildcat in an attempt to establish commercial production from a sand cased off in Monte Oscuro 1 at 2500 feet on the way to a deeper objective. No. 1, located at Latitude 6°9'58" north and Longitude 0° 13' 59" west of Bogota, attained a depth of 9150 feet before being abandoned. Unconfirmed reports were that it made salt water.

The 2500-foot sand on the Monte Oscuro structure has been called the most important wildcat strike in Colombia in two years. (During 1938 and 1939 nine wildcat completions were recorded in the country.) First to enter the play along with Shell has been Compania Nacional del Carare, a Colombian enterprise in which Tropical Oil Company, operator of the DeMares concession, is heavily interested. Carare will drill a wildcat on that section of Monte Oscuro lying within its Union concession and presumably will have the 2500-foot sand as objective also. The company announced it would abandon its second wildcat project on the San Fernando structure, located in another concession.

These developments have focused attention again on the Middle Magdalena Valley which, due to a series of dry holes or mechanical failures, had been suffering for about a year in comparison with interest shown in the Lower Magdalena Valley, where five major companies have been carrying out a large scale program of lease and concession acquirement.

Cerro de Monte Oscuro is a ridge 17 miles long lying in an almost north-south direction, with its northern extremity eight miles in from the east bank of the Magdalena River and northeast of Nare. It is classified as an assymetric anticline rising on Campania de Petroleo Shell de Colombia's 122,000-acre Carare concession on the north, continuing for about six miles through Compania Nacional de Carare's Union Concession, and plunging to the south in what may turn out to be a saddle at the Baul river on Shell's 123,000-acre Mora concession. The region embracing Cerro de Monte Oscuro is shown on the accompanying map.

Other Wildcatting Fails

As previously inferred, other Colombian wildcatting in Colombia generally was unsuccessful during 1939, especially that east of Puerto Berrio. Reference to the maps accompanying the article in this issue by Drs. Mendoza and Alvarado and to that referred to above, will assist in locating following wildcat areas.

Socony-Vacuum Oil Company was engaged in active exploration work in two areas north of the Sogamosa river. Narino 1, located 25 kilometers east of Puerto Wilches, was abandoned in the Chuspas of the Oligocene at 6516 feet because of mechanical difficulties. Narino 3, on the same structure, was drilling at 7644 feet as the year opened. North of these tests 10 kilometers, the company was fishing at 9274 feet in Peralonza 1, a wildcat located on a geophysical high. The company's Las Monas structure was reported idle so far as drilling was concerned, but was credited with having produced a small amount of oil for fuel.

El Condor Company has been busy on a concession southeast of Puerto Berrio acquired from Consorcio Minera Nacional. The first test, Zambito 1, was completed as a water well at 728 meters, while Baul 1, a wildcat at Latitude 6° 14' 33" north and Longitude 0° 18' 46" west of Bogota, was testing as the year opened.

Tropical Oil Company surrendered the Putana concession to the government after having spent considerable time and money in exploration efforts.

Production Up

Final production figures on Colombia, as revealed in a paper prepared by O. C. Wheeler, chief geologist of International Petroleum Company, Ltd., for presentation before the American Institute of Mining & Metallurgical Engineers in New York in February, gave the country credit for having recovered 23,774,159 barrels in 1939, the highest recovery in its history. This increase was due to opening of the Barco line during the latter part of the year. Since this line will run oil at the rate of 25,000 barrels per day during 1940, one may expect another substantial increase in production during this year, regardless of whether new fields are discovered.

Wheeler tells us that although Magdalena Valley wildcatting yielded no discoveries, acquisition of prospective oil lands continued

Two companies thus far have production in Colombia and pipe lines leading to tidewater. Construction difficulties similar to that shown above face other newcomers who would attain the same rating.

in the region, with mostly government lands being taken.

Barco Activities

In summing up activities on the Barco concession, he says Colombian Petroleum Company completed one wildcat for a small pumper. This organization completed 40 wells on the North Dome at Petrolea, but reported no activity on the South Dome. One completion, a producer, was recorded at Carbonera, while the Leoncita part of the concession contributed a failure. Rio de Oro, located on that part of the concession which is adjacent to Venezuela, was credited with three producers. The concession as a whole ran 1,400,000 barrels during the latter part of 1939. Its contribution to the nation's total in 1940 will be much greater.

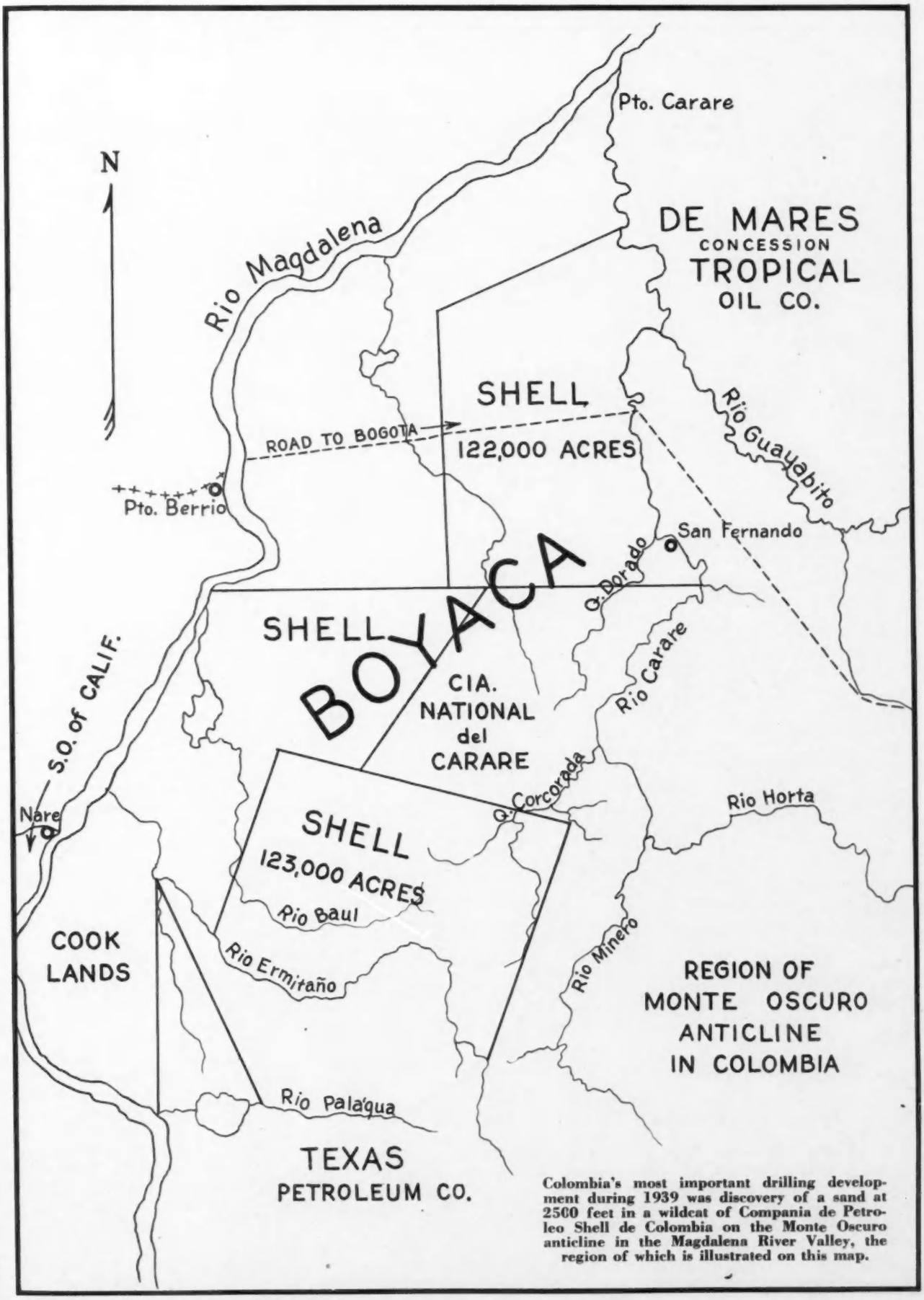
La Cira structure of Tropical Oil Company's De Mares concession had 100 completions during 1939, and all but 6 of them were C zone producers. Those 6 were perforated in the B zone. Average initial production of these La Cira producers was 528 barrels. Infantas, the only other field on the concession, recorded no completions. All of its output is pumped, whereas most of the La Cira oil is flowing production.

DeMares concession production, the oldest in Colombia, amounted to 22,374,151 barrels in 1939 and probably will remain at about that figure for 1940. Infantas field is just about drilled up, but there remains considerable drilling to be done in La Cira.

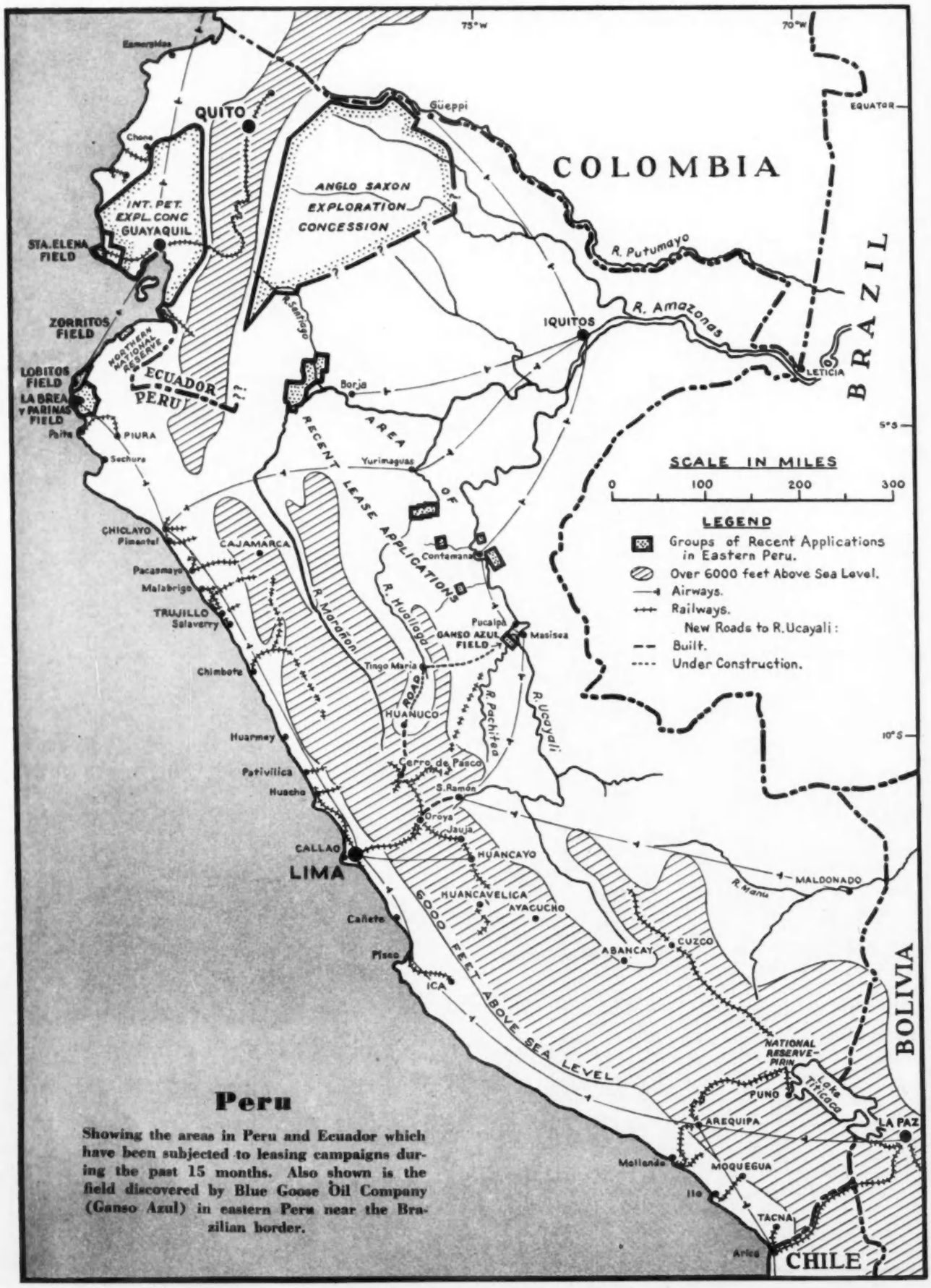
Line Completed

The most outstanding development in Colombia's oil industry during 1939 was completion of the 263-mile oil line from the Barco concession across the country to Caribbean tidewater at Covenas. This line, which can be stepped up to 70,000 barrels daily capacity when necessary, is expected to substantially increase the export rating of Colombia, which shipped out 18,535,044 barrels in 1938. The line is calculated in some quarters to add a minimum of 9,125,000 barrels to Colombia's exports in 1940. In building it, 10 planes carried 11,000,000 pounds of material to Tarra in 6000 flying hours. Steel suspension bridges were even flown in piece by piece. Commonly referred to as the Barco line, the carrier is owned and operated by South American Gulf Oil Company, which, like Colombia Petroleum Company, is a joint interest of the Texas Company and Socony-Vacuum Oil Company. A complete description of the building of the line appeared in THE OIL WEEKLY of October 23 and 30, 1939.

The second most important development in 1939, from a standpoint of future operations, was announcement late in the year that a bill had been introduced in the Colombian legislature to allow the government to enter into and participate in the development of petroleum reserves in direct competition with private enterprise.



Colombia's most important drilling development during 1939 was discovery of a sand at 2500 feet in a wildcat of Compania de Petroleo Shell de Colombia on the Monte Oscuro anticline in the Magdalena River Valley, the region of which is illustrated on this map.



Peru

Showing the areas in Peru and Ecuador which have been subjected to leasing campaigns during the past 15 months. Also shown is the field discovered by Blue Goose Oil Company (Ganso Azul) in eastern Peru near the Brazilian border.

Leasing Indicates Increase In Peruvian Wildcatting

LIVELY campaigns of concession acquisition throughout Peru during 1939 indicate a possibility of increased exploratory work during 1940 as well as a possibility that the downward trend of production [from 15,838,605 barrels in 1938 to 13,496,880 barrels in 1939] may be checked.

Oliver B. Hopkins, chief geologist for Imperial Oil Company at Toronto, Ontario, is authority for the statement that approximately 278,000 hectares, or 700,000 acres, were represented in the 16 oil and gas concessions asked for in Eastern Peru. In addition, certain concessions were taken on the West Coast.

Government Busy

Drilling in Western Peru continued throughout 1939 at a rate to assure continuation of activity during 1940. The Peruvian government continued wildcatting in the Northern National Reserve and deep testing in adjacent Zorritos field. Five tests were drilling to its account when the year closed, indicating a possibility that results in 1940 might be a little better than the poor showing made by the government during 1939, when the largest initial production recorded on its properties was 50 barrels per day. The well shortly thereafter declined to 25 barrels per day. Results of the governments wildcatting on the Pirin National Reserve, near the country's southern boundary and in the region adjoining Lake Titicaca, were one abandonment and one completion yielding oil and water. The rig is being used for a third test there. Altogether the Peruvian government, a relative newcomer in the oil business, had 14 completions to its credit as the year closed, plus the producing properties bought from Piaggio & Sons.

All in all though, as pointed out by Hopkins in a paper presented before the American Institute of Mining & Metallurgical Engineers in New York in February, wildcat efforts on the whole were without noteworthy developments, except those of Blue Goose Oil Company in Eastern Peru, the previously cited locality of most of the recent lease taking.

New Field Proven

The history of oil in Eastern Peru thus far is the history of Compania de Petroleo Ganso Azul, Limitada, the Spanish name for the Blue Goose organization, and has thus far been confined, so far as drilling is concerned, to the Aguas Calientes field on the eastern side of the Andes Mountains. Equipment entry to the field normally is by way of the Amazon River and its upper tributaries, a 3000-mile trip from the mouth of the Amazon. The field is 300 miles northeast of Lima and most of this distance can be made by auto in two days, though parts of this route are in such condition as to preclude moving in any material over it. A round trip to the field by plane from Lima requires negotiation of an Andean Pass with an elevation of more than 15,000 feet, but can be made in one day—with good luck.

The concession embraces the first slopes of the mountains and is along the upper reaches of the Huallaga and Ucayali Rivers and near the confluence of the latter with the Pachitea. The structure on which production was developed during 1939 is about 15 miles long and 7½ miles wide, with dips averaging 20 degrees. It is said to have a closure of 3600 feet and to include 50,000 acres within the closing contours. The spot was discovered from the air in 1929 by a geologist whose attention was attracted to a sugar sandstone outcrop at a time when he was looking for a route for a projected railroad. The view from the air plainly showed the structural tendency and the geologist reported the discovery to oil men in the United States. Subsequently the concession was obtained through the usual government channels.

First East of Andes

Aguas Calientes field, the first Peruvian production east of the Andes, has recorded four completions, two of which are producers. The first producer, Aguas Calientes 1-A, initialed 750 barrels of 45-gravity oil per day when completed February 26, 1939, at 1174 feet. Production is found in lime at depths ranging from 1020 feet to 1250 feet. Hopkins says it is probably Lower Cretaceous. J. E. Brantly, geologist and petroleum engineer who supervised exploratory efforts of the Blue Goose, thinks it is possibly Jurassic or Permian. The oil is under a definite water drive and has practically no dissolved gas in it. One of the producers will make 300 barrels daily through ¼-inch choke, while the other produced up to 2000 barrels daily through a 2-inch choke.

The medium weight rotary equipment used in drilling Aguas Calientes field was shipped in a roundabout manner from California by Drilling & Exploration Company, drilling contractors who have done all the field work. The route was from California via the Panama Canal to New York, thence to the Amazon River and its upper tributaries. The boat carrying the equipment up the Amazon River sank, and only 25 percent of the cargo was saved, necessitating a second shipment.

Operating Conditions Unique

Operating conditions are unique in several respects. A good grade of mahogany wood is used for boiler fuel. About 100 natives are required to keep four boilers in wood, daily consumption is from four to eight cords per day per boiler during active drilling operations. In addition to the four 125-horsepower, 250-pound pressure boilers, some of the other equipment items

include two 14 x 7¼ x 18 slush pumps, 11 x 11 twin drilling engine, and such equipment as would be used for drilling to 7000 feet in the United States. Lighter equipment could easily be used, but since only the original equipment is available, it will continue in service for drilling additional wells on the concession.

There is no outlet for the oil and no plans have been considered for marketing it in competition with more accessible production. It is believed that oil could be barged down the Amazon and placed on the world markets at a cost of about 75 cents per barrel.

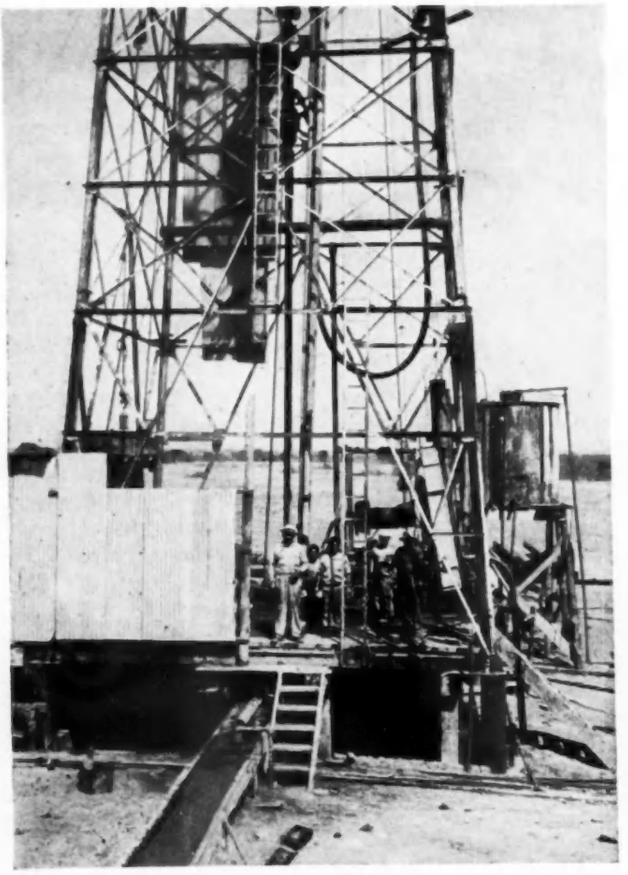
Other Peruvian Fields

Fields contributing to Peru's 13,496,880-barrel recovery in 1939 were: Zorritos, 40,000 barrels; Lobitos, 2,650,000 barrels; and La Brea-Parinas estate, 10,806,880 barrels.

International Petroleum Company's La Brea-Parinas field, south of Zoritos and Lobitos on the western coast of Peru, completed 73 wells during 1939, most of which were in proven or semi-proven area. This compares with 65 completions in 1938. Several drilling methods are in use in the area as the 1939 completions represented 44 rotary, 13 cable tool, and 16 portable cable tool jobs. In 1938 the completions were divided as follows: 34 rotary, 11 cable, and 20 portable cable tool jobs. Cumulative completions in La Brea-Parinas to the end of 1939 totaled 3111, of which 1993 were producers. As of December 31 the field reported 88 flowing wells and 1788 on artificial lift. Cumulative production of the field to the end of 1939 totaled 202,356,635 barrels.

The most important development in La Brea-Parinas during 1939 was completion of a deep test, No. 3075, in December in a sand at 4500 feet for an initial production of 1500 barrels.

Zorritos, northernmost field of Peru, and also on the Pacific Coast, was acquired from private enterprise and has been operated for some time by the government in conjunction with activities in the nearby Northern National Reserve area. Production increased from 110 barrels daily in 1938 to 166 barrels in 1939. Construction has been started on a 1000-barrel refinery, which is to include a gasoline extraction plant. In addition, the government is laying a 20-mile water pipe line to Zorritos from the Tumbes River.



This was the rig used by Anglo-Ecuadorean Oilfields, Limited, in discovering a new field on an extension to Ancon production at 3991 feet during 1939.

Ecuador May Record New High in 1940

ECUADOR, which preliminary figures credit with having produced about 2,260,000 barrels in 1939 to establish a minor increase over the 2,245,772 barrels produced in 1938, probably will show another rise in output during 1940 from recently discovered flush production and from anticipated increased demand for the type of crude produced by the country. Nine rigs were reported in operation as the year ended.

Highlighting 1940 developments will be continuation of exploitation of the new crevice production from lower sands, about 3800 feet in depth, found northeast of Ancon Peninsula production. There seems to be some question as to whether the strike should be regarded as an extension of older areas or as the new El Tigre field. The sand is said to correlate with the deeper production of the Santa Elena neighborhood. Gap drilling between the strike and the older fields is in progress and should settle the question during 1940.

There will likewise be considerable attention focused on exploration activities of Shell Oil Company of Ecuador, reconnaissance headquarters of which are at Zulay, on a 25,000,000-acre concession east of the Andes and bordering Colombia. This concession was transferred to the Shell by Anglo Saxon Petroleum Company, which received the grant August 9, 1937. Also, International Petroleum Company, which has a four-year-old concession of 10,000,000 acres fronting the Pacific Ocean and lying north of Santa Elena production, will continue geological and geophysical work thereon during the year.

Work is suspended temporarily on the San Gabriel exploratory concession east of Ancon obtained two years ago by Otto Wolfe, representing German interests. He is said to have put down two inconclusive tests on the property.

More Testing Needed to Prove Colombian Reserves

By DR. FELIX MENDOZA[a], Petroleum Engineer
and
DR. BENJAMIN ALVARADO[b], Geologist

GONZALO Fernández de Oviedo y Valdés, famous Spanish Royal Chronicler for the West Indies, telling us of his meeting in Santo Domingo Island, in the year 1541, with Captains Joan del Junco and Gómez del Corral, conqueror Quesada's lieutenants, writes as follows:

"Among other things, they testified that one day beyond the town of Latora (Barrancas Bermejas of Quesada), there is a bitumen fountain or boiling well, yielding large quantities of a thick liquor that overflows the land. They said further, that Indians use that bitumen in their homes for anointing purposes, as it prevents them from being tired and fortifies their legs. And that said liquor is a black, pitch-smelling liquor and the Christians use it to calk their brigs."

It is, thus, clearly seen that it was Don Gonzalo Jiménez de Quesada himself who was the real discoverer of petroleum in the country. Centuries later, Coronel Bohórquez would find again the famous bitumen fountains which were to give rise to the petroleum industry in Colombia.

Nineteenth Century

Toward the middle of the nineteenth century, the National Government issued a permit in favor of señor Jorge Isaacs[1] for the exploitation of coal beds along the Colombian Atlantic Coast. The permit was definitely cancelled by the government some time later.

Twentieth Century

In August, 1905, Roberto de Mares filed an application before the Ministry of Public Works, requesting the privilege to exploit petroleum, coal and asphalt, for a period of 50 years, in the areas bordering the Opon and Carare rivers. On November 28 of that year, a contract was signed between the National Government and De Mares. The contract was registered December 15, 1905, under number, 2207 before a notary public, in Bogotá City.

According to the contract, De Mares had the obligation of "organizing a company or syndicate with sufficient capital for the exploitation, on a large scale, of petroleum wells or petroleum sources which could be found in public lands comprised within the following limits: from the mouth of the Sogamoso River in the Magdalena River, thence along this latter river upstream to the mouth of the Carare River; along the Carare River upstream to the eastern Andes mountain range, and, following this range, to the Sogamoso River; along this river downstream to the starting point."

Geological surveying began in October, 1915, and in June of the following year, drilling operations were started. The first well, Infantas No. 1, was drilled to 262 meters, combination rotary-percussion equipment being used.

The same equipment was used in Number 2, which was drilled to 464 meters. Production from this well started April 29, 1918. Up to August, 1921, three wells existing in the concession had produced a total yield of 66,750 U. S. barrels.

With the idea of increasing this comparatively low production De Mares signed a contract with J. C. Trees, G. W. Crawford, and L. Benedum of Pittsburgh, Pennsylvania, U. S. A. This contract was registered May 17, 1916. Trees, Crawford, and Benedum then organized Tropical Oil Company.

On August 23, 1919, a resolution was issued by the Ministry of Public Works, granting De Mares the right to transfer the concession to Tropical Oil Company. This transfer was legalized August 25, 1919. The concession comprises 512,000 hectares (approximately 1,264,000 acres), its boundaries being the Magdalena, Carare and Sogamoso rivers, and the eastern Andes mountain range, as stated above.

Two Structures Produce

Up to the present time, production has been confined to "Infantas" and "La Cira": two anticlinal structures that constitute only one percent of the total area of the concession. Unit operation, the only system used in the country, has been employed in the development of these structures.

Drilling operations were intensified by Tropical Oil Company in 1922, with a remarkable increase in oil production. A refinery unit was constructed in Barrancabermeja during February of the same year. Up to 1926, practically the whole production was taken up by the stills, which had a capacity of 1400 barrels per day.

A pipe line, connecting the Tropical Oil Company concession with a port on the Atlantic coast, was opened to service in 1926; from that year on, Colombian crude began to play a part in international markets. Gas plants were built in the concession during 1927 for the production of natural gasoline. Part of this gasoline is used in refining operations and the rest of it, mixed with the crude, is run through the pipe line.

Andian Pipe Line

On October 1, 1923, the government signed a contract with Andian

[a] Graduate of University of Oklahoma; [b] graduate of University of Minnesota. Both are in Colombia's Department of Petroleum.
[1] Famous Colombian Novelist.

ALVARADO

National Corporation Limited, a subsidiary of the International Petroleum Corporation of Canada, for construction and operation of a pipe line. The main features of this contract may be summarized as follows: (1) The pipe line was to start at a point located between the Cispata and Bahía Honda bays, on the Atlantic coast, ending at another point on the Magdalena River, a distance of approximately 800 kilometers from the starting point; (2) the pipe line was to be a common carrier; (3) each month the company was to transport, free of charge, a quantity of crude oil or of refined products belonging to the national government, for an 18-hour period, which time was not to be allowed to accumulate from one month to the next; (4) no monopoly was to be thereby granted to the company; (5) the company was to be exempt from all state and municipal taxes, and from the national tax on river transportation; (6) the pipe line was to be open to public service four years after the contract was officially registered; (7) transportation tariffs were to be revised every five years, according to the tariffs specified in the contract and/or to those other tariffs which might be in use, at the time, in other pipe lines, whether national or not, whose construction and maintenance cost might be considered similar to those of the Andian pipe line; (8) the contract to terminate after 50 years.

The pipe line was finished March 6, 1926. The first Colombian crude reached the coast June 10 of the same year, exportation being started July 3, 1927. On that date, a cargo of 87,128.64 U. S. barrels was shipped to New York on boat "T. J. Williams."

The flow of oil is maintained by means of nine pumping stations properly spaced along the pipe line.

Barco Concession

On October 16, 1905, a contract was signed between the Colombian government, represented by the minister of public works, and Virgilio Barco, granting Barco the right to exploit petroleum and coal mines that might be discovered within public lands in the Department of Santander in an area bounded by the San Miguel, San Miguelito, and Mito-Juan rivers and located near the boundary of the Republic of Venezuela.

Principal features of the contract were: (1) submission of maps and geological investigations within one year from the date of the contract; (2) fifty years duration; (3) obligation to start exploratory works three years after approval; (4) exemption from all national, state and municipal taxes; (5) obligation to pay the government 15 percent of net profits; (6) reversion to the government of all materials and equipment, at the expiration of the contract or in case of forfeiture; (7) right to transfer the concession with the government's approval; (8) approval by the president and national congress.

The contract was registered in Cúcuta, under number 536, on December 5, 1905, and approved by the executive council, in Bogotá the same month.

Road building was started by Barco immediately thereafter, and in October, 1906, the contractor asked permission to establish a provisional refinery in Cúcuta. Permission was granted and, thus, the first Colombian refinery came into existence. Years later, this refinery was transferred from Cúcuta to La Petrólea camp.

Having met with comparatively little success, Barco was moved to reach an optional agreement with Frank Kisser in 1924. As a result of the agreement, a technical commission was sent to study the concession.

Three years later, Barco's request to transfer the concession to Compañía de Petróleo, Colombia, S. A. was approved by the government; such transfer however, never took place. Later on, the Compañía Colombiana de Petróleos was formed and this company, with the government's approval, purchased the concession from Barco.

MENDOZA

The Compañía Colombiana de Petróleos was controlled by Colombian Petroleum Company (Henry L. Doherty & Co.) and this concern drilled the first well on the Río de Oro banks, reaching a depth of 271 meters and obtaining a daily production of 1500 barrels.

After prolonged discussions, the Barco concession was cancelled by the government in February, 1926. Barco and his relatives' appeal for reconsideration of the provision of cancellation was met with refusal.

On September 24, 1928, the Compañía Colombiana de Petróleos made a similar appeal which was, also, refused by the Colombian government. Later on, the company tried to submit the question to the consideration of the supreme court of justice. In the meantime, private negotiations were carried on between the government, the Colombian Petroleum Company and the South American Gulf Oil Company.

Finally, in 1931, as a result of those negotiations, a contract was signed by the government with these two concerns. The contract provided for the exploitation of crude oil by the Colombian Petroleum Company, and for the transportation of said crude by the South American Gulf Oil Com-

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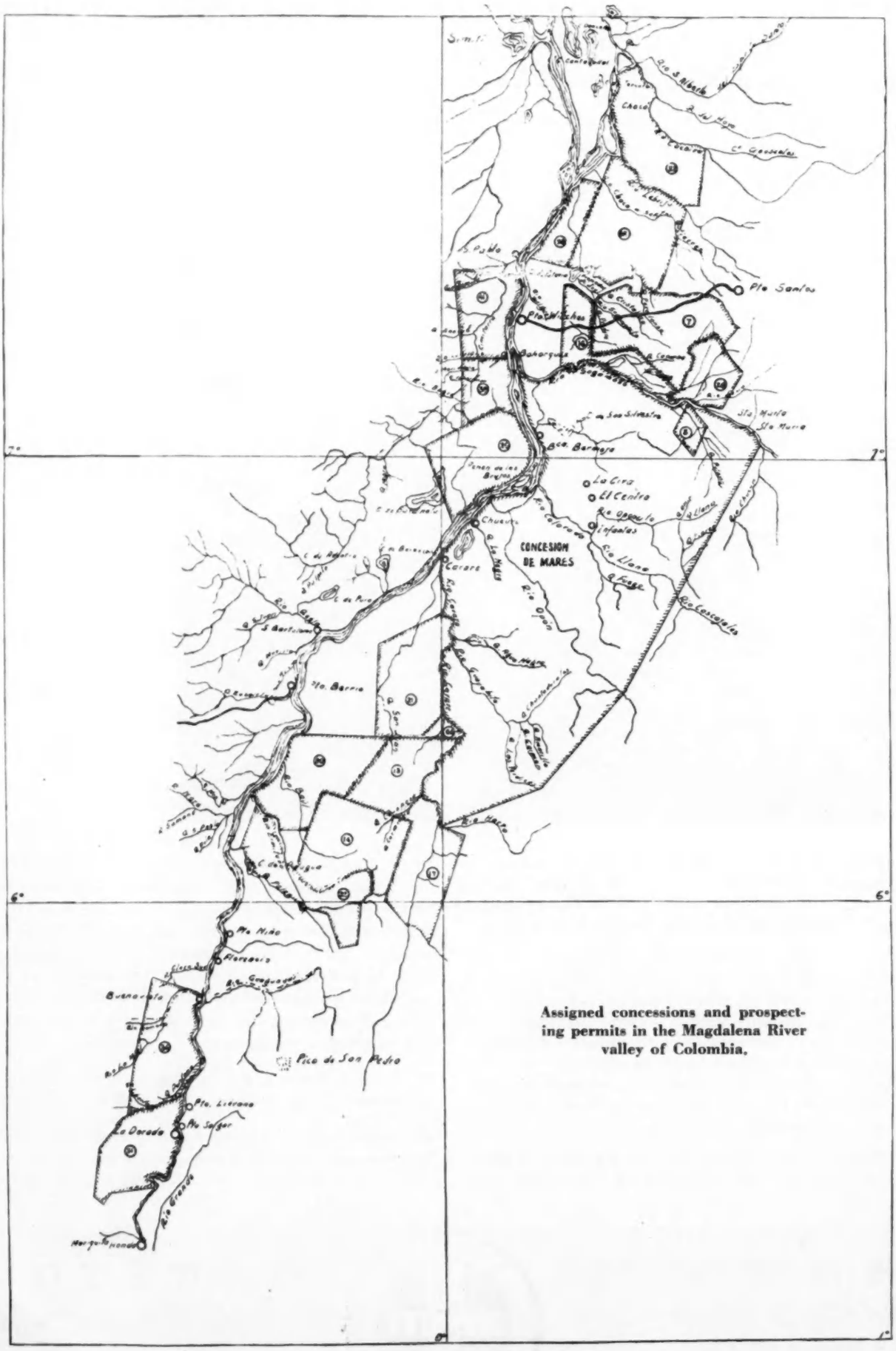


Assigned concessions and prospecting permits in the Magdalena River valley of Colombia.

pany, both companies, however, acting "in solidum."

The contract was thoroughly debated in the Colombian congress and finally became national law under title No. 80 of 1931. Exploratory work has been under way since 1931.

Other Concessions

From 1905 up to 1920, work was also conducted in other parts of the country: to 1918, eight wells had been drilled in the "Las Perdices" area, some 10 kilometers (6.25 miles) southwest of Puerto Colombia. Drilling, started as early as 1907 by a Canadian concern, was continued in 1931 by the Kelly Oil Company. The deepest of these wells was well Number 6, which reached a depth of 924 meters, yielding natural gas and few showings of crude oil. Best results were obtained at No. 1, which yielded a high gravity (32°-42° Bé.) crude. Other wells were drilled to depths of less than 457 meters, showing traces of crude oil and gas.

Two wells were drilled by Richmond Petroleum Company during 1924 in the region of Usiacurí, 24 kilometers south of Barranquilla. Both wells were abandoned on account of difficult drilling problems.

In Turbaco, a railroad station on the Cartagena-Calamar Railway, Martínez Oil Company began drilling operations in 1908. Five wells were drilled, one of them reaching a depth of 667 meters. References had been made by early explorers as to the possible petroleum productivity of that area, but neither the Martínez Oil Company nor the Standard Oil Company, which operated in conjunction with Martínez in 1910, met with satisfactory results.

Drilling operations were also conducted by Transcontinental Oil Company and Shell Petroleum Company in the town of Zambrano, some 160 kilometers (100 miles) south of the Magdalena River mouth. Two wells were drilled, one of them drilled to a depth of 225 meters, encountering thick salt-water sand.

Richmond Petroleum Company carried on drilling operations in the Carmen and San Jacinto areas, Department of Bolívar, some 60 kilometers (37.5 miles) south of Cartagena, on lands of the Latin American Petroleum concession. Only traces of gas and of liquid crude were obtained.

In 1924, Gulf Oil Company drilled two wells in the region of San Andrés, Department of Bolívar. One of these wells reached a depth of 1120 meters and the other 1051 meters, both being declared dry holes.

To the north of the Tropical Oil concession, Colombian Syndicate found good quality crude in six wells drilled in that region, none of which however, was considered commercially productive.

Magdalena River Valley

A 213-meter well was drilled by Carib Syndicate at a place located 5 kilometers (3.1 miles) southwest of San Felipe, on La Dorada Railway. The syndicate found traces of asphaltic petroleum, but the work had to be discontinued as crystalline schists were encountered.

In 1921 the Transcontinental Oil Company drilled two wells: one southwest of Honda to a depth of 1005 meters, and the other near the town of Guataquí to a depth of 857 meters. Gas and petroleum shows were found in both wells.

Besides the companies already mentioned, several other companies have been engaged in minor petroleum activities in different regions of the country. Account of all these operations would be too long and largely void of interest.

Development of Industry

With the help and collaboration of national and foreign authorities on the subject, the national government initiated a complete study of petroleum legislation and as a result of the study, presented to the national congress of 1929 a proposed petroleum code which, after having been discussed and modified in the congress of that and the two subsequent years, was approved under the title of Law 37 of 1931, a legal statute now in operation.

The congress of 1931 also approved, by Law 80 of the same year, the contract between the National Government and the Colombian Petroleum Company and the South American Gulf Oil Company to explore and exploit the lands of the old Barco concession.

Before the enactment of Law 37

Table 1

Concessions and Accepted Applications

(Laws 37 of 1931 and 160 of 1936)

No.	Application Number	Present Status	NAME	PRESENT OWNER	DEPARTMENT	Acres
1	5	C	Putana	Tropical Oil Company	Santander	19,414.65
2	7	C	Luciano Restrepo	Socony-Vacuum Oil Co. de Colombia	Santander	121,652.27
3	13	C	Sociedad Nacional del Carare	Sociedad Nacional del Carare	Santander	82,716.73
4	14	C	Bernardo Mora	Cía. de Petroleos Shell de Columbia	Santander	123,550.00
5	15	C	Daniel A. del Rio	Daniel A. del Rio	Bolivar and Atlantico	49,765.94
6	16	P	Socony-Vacuum Oil Co. de Colombia	Socony-Vacuum Oil Co. de Colombia	Santander	66,815.84
7	17	P	Mora Hermanos y Pelaez Hermanos	Mora Hermanos y Pelaez Hermanos	Santander	104,611.07
8	18	C	Compania de Petroleos del Carare	Compania de Petroleos del Carare	Santander	122,650.56
9	20	C	Consorcio Minero Nacional	Cía Col. de Petroleos "El Condor"	Santander	109,361.52
10	21	C	Compania de Petroleos Shell de Colombia	Cía. de Petroleos Shell de Colombia	Santander	123,318.96
11	22	P	Sindicato de Inversiones, S. A.	Sindicato de Inversiones, S. A.	Santander and Magd.	118,373.26
12	23	P	Evaristo Obregon Arjona	Evaristo Obregon Arjona	Santander and Boyaca	105,131.17
13	26	C	Cía. Col. de Petroleos "El Condor"	Cía. Col. de Petroleos "El Condor"	Antioquia	118,138.57
14	28	P	Frederick R. Ryan	Frederick R. Ryan	Santander	47,759.49
15	34	P	Jaime Gutierrez	Jaime Gutierrez	Antioquia and Caldas	121,570.73
16	38	P	Juan de Dios Gutierrez	Juan de Dios Gutierrez	Antioquia	41,825.48
17	41	P	Cía. de Petroleos del Valle del Magdalena	Cía. de Petroleos del Valle del Magdalena	Santander	81,244.01
18	44	P	Texas Petroleum Company	Texas Petroleum Company	Boyaca, Cund. and Int. del Meta	247,100.00
19	47	P	Roberto Pena	Roberto Pena	Antioquia and Bolivar	111,081.33
20	51	P	Carlos de Narvaez	Carlos de Narvaez	Antioquia and Caldas	88,992.20
21	56	P	Cía. de Petroleos Shell de Colombia	Cía. de Petroleos Shell de Colombia	Intendancy of Meta	247,100.00
22	59	P	William A. McArthy	William A. McArthy	Santander	50,704.92
23	60	P	Francisco Rocha Vargas	Francisco Rocha Vargas	Santander	8,359.39
						2,311,238.03

C—Contract. P—Application.

of 1931 several companies were working in the country. Among them are the following: Caribbean Petroleum Company, Coastal Oil Fields of Colombia, Colombian Oilfields Limited, Colombian Syndicate, Compañía Colombiana de Petróleos, Compagnie Française des Pétroles, Granada Oil Company, Latin American Petroleum Corporation, Leonard Development Company, Leonard Exploration Company, Lobitos Oilfields Limited, Magdalena Syndicate, Mid Colombia Oil & Development Company, Nato Petroleum Company, Richmond Petroleum Company of Colombia, Sociedad Colombiana de Fomento, Société Européenne des Pétroles, South American Gulf Oil Company, Texas Petroleum Company, Transcontinental Petroleum Company, Tropical Oil Company, and Unión Colombiana de Petróleos.

Over 50 wells other than those of Tropical Oil Company on the De Mares concession were drilled on national lands throughout the country before 1931. However, the lands were not tested properly and completely, and consequently, no new fields were opened.

Under operation of the present legislation the national government has signed contracts and accepted applications for concessions on oil lands as shown in Table 1.

The Magdalena River valley has been the center of major activity as is shown by the number of applications accepted for lands in this area, which appear in Table 2.

TABLE 2

Accepted Applications and granted Concessions—Magdalena River Valley

5—Putana (Tropical).
7—Luciano Restrepo (Socony).
13—Sociedad Nacional del Carare.
14—Bernardo Mora (Shell).
16—Socony-Vacuum Oil Co. de Colombia.
17—Mora Hermanos y Peláez Hermanos.
18—Compañía de Petróleos del Carare.
20—Consorcio Minero Nacional (El Cóndor).
21—Compañía de Petróleos Shell de Colombia.
22—Sindicato de Inversions, S. A.
23—Evaristo Obregón Arjona.
26—Compañía Colombiana de Petróleo "El Cóndor."
28—Frederick R. Ryan.
34—Jaime Gutiérrez.
38—Juan de Dios Gutiérrez.
41—Compañía de Petróleos del Valle del Magdalena.
51—Carlos de Narváez.
59—William A. McArthy.
60—Francisco Rocha Vargas.

Presents Status of Principal Operations

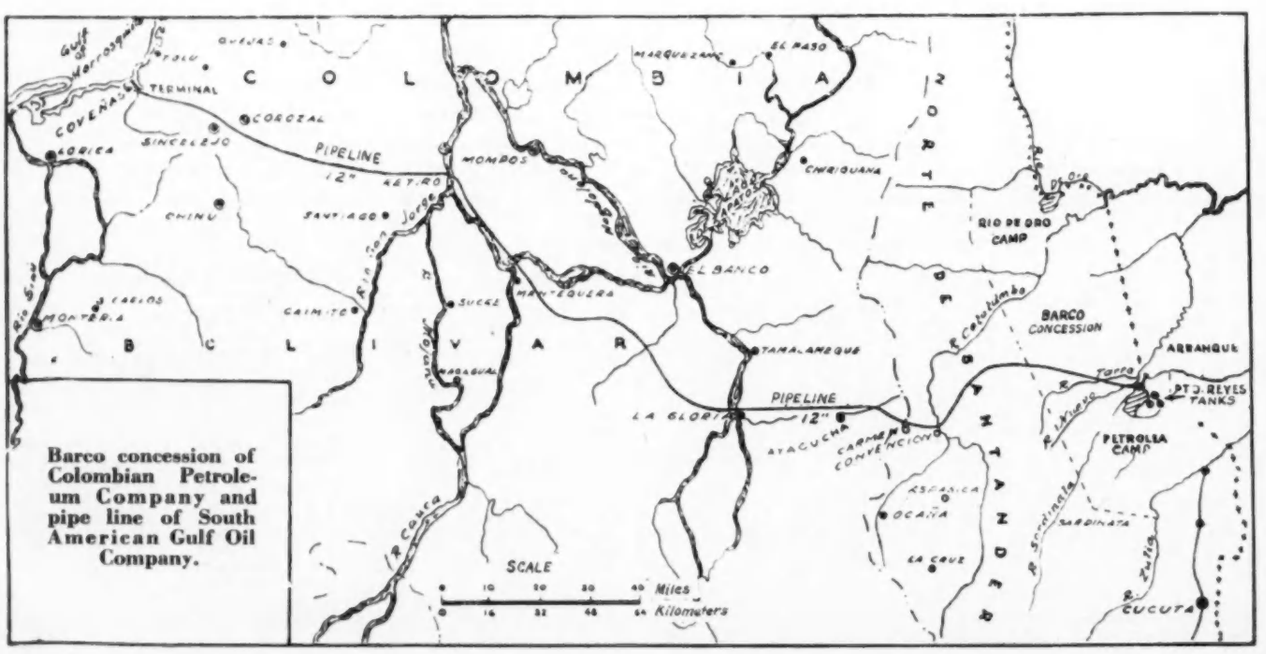
The bulk of the crude oil produced from Infantas and LaCira is transported by pipe line from the field to the ocean terminal at Cartagena through a 335-mile pipe line system that is owned and operated by the Andian National Corporation, Ltd. This company operates as a public carrier under a 50-year contract granted by the Colombian government.

The initial single line was 10 inches in diameter, and was placed in operation in June, 1926. The first tanker was loaded at Mamonal Terminal in Cartagena on July 2, 1926.

Due to the rapidly increased producing rate of the field immediately thereafter, it was necessary to enlarge the capacity of the line, and consequently some 285 miles of 10-inch loop were added in 1927, and this was further augmented by 20 miles of 12-inch loop in 1937. With such additions the line now has a daily capacity of 52,000 barrels at 625 pounds operating pressure. Up to December 31, 1938, a total of 203,110,795.95 barrels of crude had been transported from the field to the ocean terminal.

There are 10 stations along the line, including the station at Mamonal used for loading tankers. Tank farms and power and pump equipment at these station are shown on the next page in Tables 3 and 4. Pumps and engines are direct connected.

The main warehouse and shops for The Andian are located at Calamar, a port on the Magdalena River, which is also connected to the city of Cartagena by narrow-gauge railway service. Modern residences are provided for the staff in Bocagrande, a suburb of Cartagena, and no expense is spared toward furnishing the best of living conditions for the staff at stations along the line. These latter each have complete electric power generating units, ice making machines, domestic water systems with chlorinators, as well as modern office buildings, residences for families,



Barco concession of Colombian Petroleum Company and pipe line of South American Gulf Oil Company.

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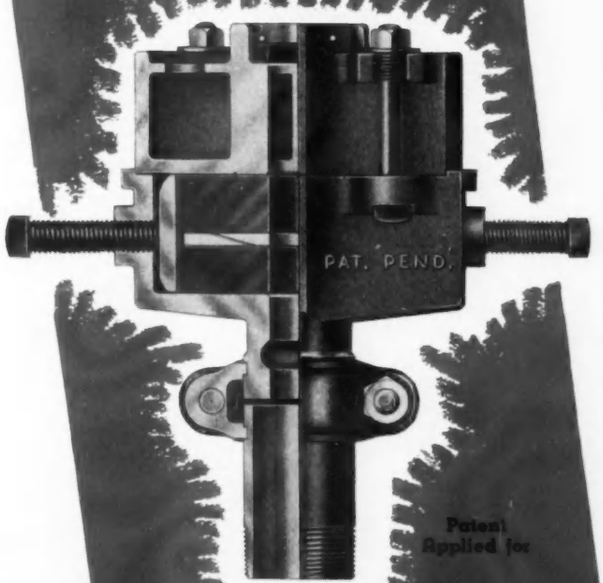

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and bachelor quarters plus dining halls for single personnel.

Maintenance work is done regularly and small changes in the running of the line are made from time to time due to the river incursions in the low lying lands traversed.

The Andian National Corporation has also a hospital at Mamonal. It has all modern conveniences and is attended by first class personnel.

Colombian Petroleum Company

The Colombian Petroleum Company is carrying on operations on lands of the old Barco concession by virtue of a contract signed with The National Government.[3] Up to the present time there have been completed 54 wells, of which 45 are located in La Petrólea, 8 in Rí o de Oro, and 1 in Leoncito. Table 5 shows the location, initial production, and other characteristics of such wells. An exploratory well is now being drilled in the Carbonera structure, five wells in Petrólea and two in Río de Oro field. The high A.P.I. gravity of the crudes from both of these fields is remarkable.

The total area of the concession covers approximately 988,400 acres of which the company has the right to reserve up to 494,200 acres within the first 10 years of the contract. Reservation of five lots comprising 148,272 acres and covering the structures of La Petrólea, Leoncito, and Carbonera has already been made.

The company is carrying on the construction of roads to the drilling wells, detailed work on the topography of the area; surface geology; and has contracted aereophotogrammetric work over all the concession, after the establishment of a primary triangulation net as a basis for map construction.

The La Petrólea and Río de Oro camps, provide facilities for operations.

[3] Later data on the Barco concession development appears elsewhere in this issue.

Compañía de Petróleos del Carare

This company has a 122-650.56 acres concession in the Department of Santander. Geophysical investigations over the entire area of the concession are carried on at the present time as the topography of the land and the absence of exposures at the surface makes it difficult, if not impossible, to carry on any other kind of exploratory work. It is expected to be possible to locate by this means the structural highs favorable for oil accumulation in order to have a scientific basis for oil well locations.

Compañía Colombiana de Petróleos "El Cóndor"

Compañía Colombiana de Petróleos "El Cóndor" owns two concessions, one of 118,138.51 acres in the Department of Antioquia, granted by the national government, and the other of 109,361.52 acres in the Department of Santander, obtained by transfer from the Consorcio Minero Nacional of the latter company's concession. "El Cóndor" company at the present time is drilling Baul 1 on lands of the Consorcio Minero concession. The company has a good many favorable elements, such as first class equipment, comfortable camps, and well serviced hospitals. The main camp is located in Zambito across the Magdalena River, where the company has built engineering offices, a 50-bed hospital, warehouses, workers and employes houses, and dining rooms. The water used at this camp comes from Zambito 1, which was plugged back. The fresh water producing horizon is a sand located between the 1000-foot and the 1240-foot depth.

Compañía de Petroleos Shell de Colombia

At the present time this company owns two oil land concessions. One of them was transferred to the company by Sr. Bernardo Mora. This concession has an area of 123,550 acres and is located in the Department of Santander. Among the works already done by the company are the construction of a highway 21 miles long from Zambito to Monte Oscuro, of which 15 miles of 23-foot width and 10 percent maximum gradient are already in service; some provisional camps for geological and geophysical exploration crews as well as aereophotogrammetric studies of almost the entire area of the concession.

The other, known as the San Juan concession, located in the municipality of Bolívar, Department of Santander, covers an area of 123,317.73 acres and was granted to the company by the Colombian government. The drilling of Sullivan 1 on this concession was completed during the early part of the year and abandoned after all desired data were obtained.

Recently the national government accepted an application of the company for a concession over an area of 247,100 acres in the Intendancy of Meta. Geophysical prospecting has been carried on in this area as most of the land is covered by recent material which does not allow the study of the area by ordinary methods of surface geology.

Richmond Petroleum Company has been in the country for a long period of time without dealing directly with the government. Leasing of private lands to an extent known only to the company, has been, up to the present, its main activity.

Sociedad Nacional del Carare, owner of a 82,716.73-acre concession in the Department of Santander, is carrying on drilling operations at San Fernando 2. San Fernando 1, nearby, was abandoned due to mechanical difficulties.

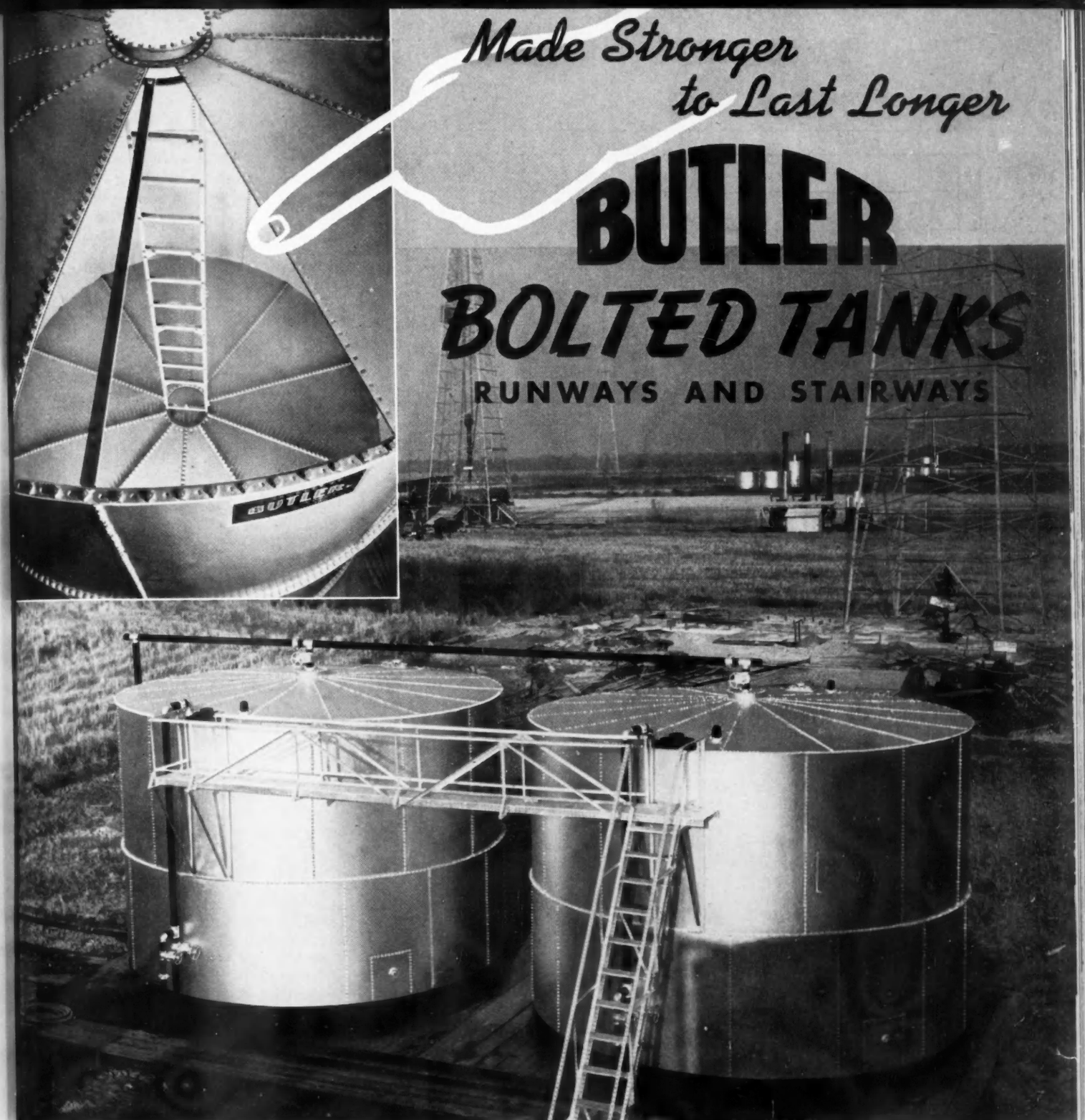
Socony-Vacuum Oil Company de Colombia

Socony-Vacuum Oil Company de Colombia owns one concession on government lands. This 121,652.27-acre concession, located in the Department of Santander, was granted to Sr. Luciano Restrepo by the national government and was transferred by him to the company. The national government also has accepted an application made by the company for a concession over an area of 66,815.84 acres, located in the same department.

This company is conducting intensive exploratory work over the

Table 3

Name of Station	No. of Diesel Units			No. of Pumps		
				Duplex		Triplex
	260 H.P.	500 H.P.	200 H.P.	5½	11½	6¼
El Centro	..	4	..	4	..	..
Galan	3	..	..	..	..	3
Chingale	2	..	2	2	..	2
Puerto Mosquito	2	..	2	2	..	2
Castilla	2	..	2	2	..	2
Los Negritos	2	..	2	2	..	2
Santa Ana	2	..	2	2	..	2
Palato	2	..	2	2	..	2
Barranca Nueva	3	..	..	..	..	3
Units actually handling oil down line	18	4	12	16	..	18
Units loading Tankers at Mamonal	..	4	..	..	4	..
Total Units	18	8	12	16	4	18



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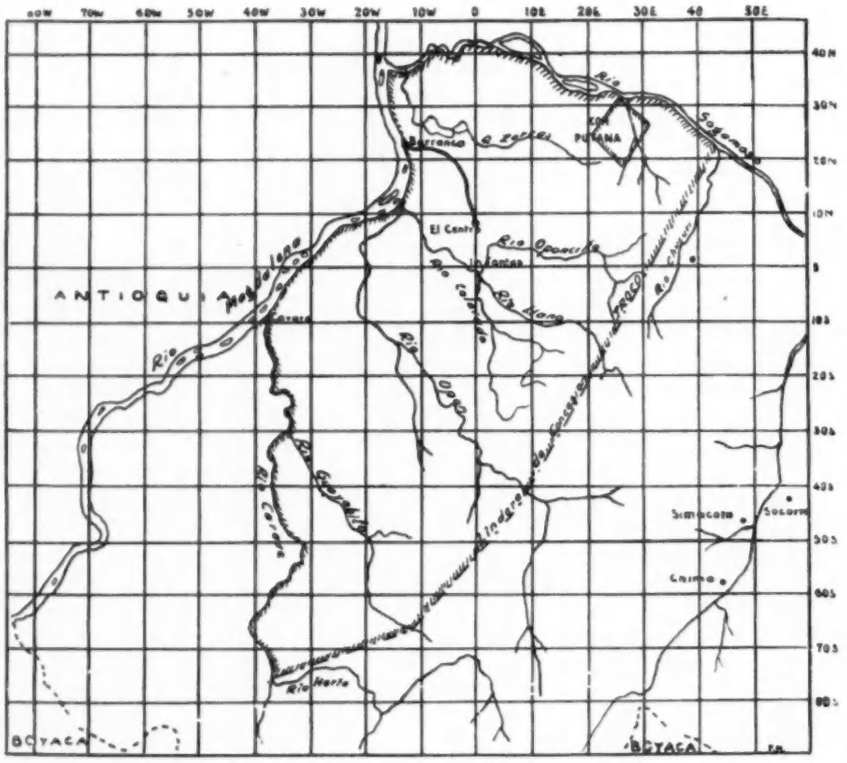

Tropical Oil Company's De Mares concession.

entire area of the Restrepo concession. Three wells were drilled on the Las Monas structure, one of which, Las Monas 1, has been pumping small amounts of oil. Oil seepages along the structure are extensive and show that it is favorable for oil accumulation.

Besides the wells located in the Las Monas structure the company has drilled Nariño 1 in the southeastern part of the concession. This well was abandoned on account of mechanical difficulties which prevented the reaching of the desired depth. On April 1, 1939, the company spudded in Peralonso 1 in the north central part of the concession.

The main camp for operations is located in Aguas Claras on the east boundary of the concession. A good airplane landing field makes for rapid communication with any place in the country. The camp is large and comfortable. There are dwellings for workmen and employes, dining rooms, well provided food storehouses and warehouses, electric power plant, offices for general engineering, geology, drilling department, transportation and management, laboratory, and a hospital.

Married employes are given separate and comfortable houses. The personnel is under the supervision and control of a Colombian employe, and up to the present, the company has been free from social problems.

Geological and geophysical investigations have been carried on in such a manner that structural highs suggesting favorable locations have been determined. Surface geology has been done on the area on which the application for a concession has been made.

South American Gulf Oil Company

This company has constructed a pipe line from the Catatumbo region to Coveñas on the Caribbean Sea, in compliance with the contract signed with the national government and approved by the congress by Law 80 of 1931.

The pipe line is 12 inches in diameter and will have when finished approximately 256 miles in length. Between La Gloria, port over the Magdalena River, and Convención, runs a highway parallel to the line.

Texas Petroleum Company has been working in the country for a good many years, principally on the leasing of private lands. Recently the government accepted an application from the company for a 247,100-acre concession in the Eastern Llanos, located in the departments of Boyacá, Cundinamarca, and the Intendancy of Meta. The company is carrying on surface geology and surveys for road building purposes.

It is expected that this company will begin drilling operations during the present year in some of its Magdalena valley private properties.

Tropical Oil Company

Flowing northward into the Caribbean Sea between two towering branches of the Andes is the great Magdalena River. About 28 kilometers east of the Magdalena River and about 650 kilometers southward from its mouth are two producing oil fields. These two fields are in the De Mares concession granted to the Tropical Oil Company by the Colombian government.

At the present date these fields, Infantas and La Cira, are the only productive structures within the De Mares concession. Numerous other structures have been found by geological or geophysical means.

The source of the oil on both the Infantas and La Cira structures is the black petroliferous shales and limestones of Cretaceous age. The main producing horizon in both fields is a sand of upper Eocene age. Some production is also obtained from two sandy members of Oligocene age. The average depth to the main producing horizon for the two fields is about 3200 feet.

Two tests of the underlying Cretaceous beds have been drilled at Infantas. Both of these were dry. A third Cretaceous test has been drilled to a depth of 8051 feet at La Cira.

Structurally, the Infantas field is a faulted anticline with a length in a N-S direction of 11 kilometers, and an average width of about 2 kilometers. Only the western flank is productive as the main Eocene sands along the east flank have been faulted up along a thrust, so that they are now exposed at the surface. It is along this flank that the seepages and oil stained sandstones, first found by the Indians and rediscovered by Bohórquez, occur.

The La Cira field is a more gently arched structure, located *en echelon*, a short distance to the northwest of the Infantas field. Its maximum length in a N-S direction is 8 kilometers, and it has an average width of 4.5 kilometers. The structure of both fields is complicated by minor transverse faults.

The present production from the Infantas field has been obtained from 2200 hectares, and in the La cira field from about 3600 hectares

Producing methods employed are

See the Latest Developments in

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- PRODUCING
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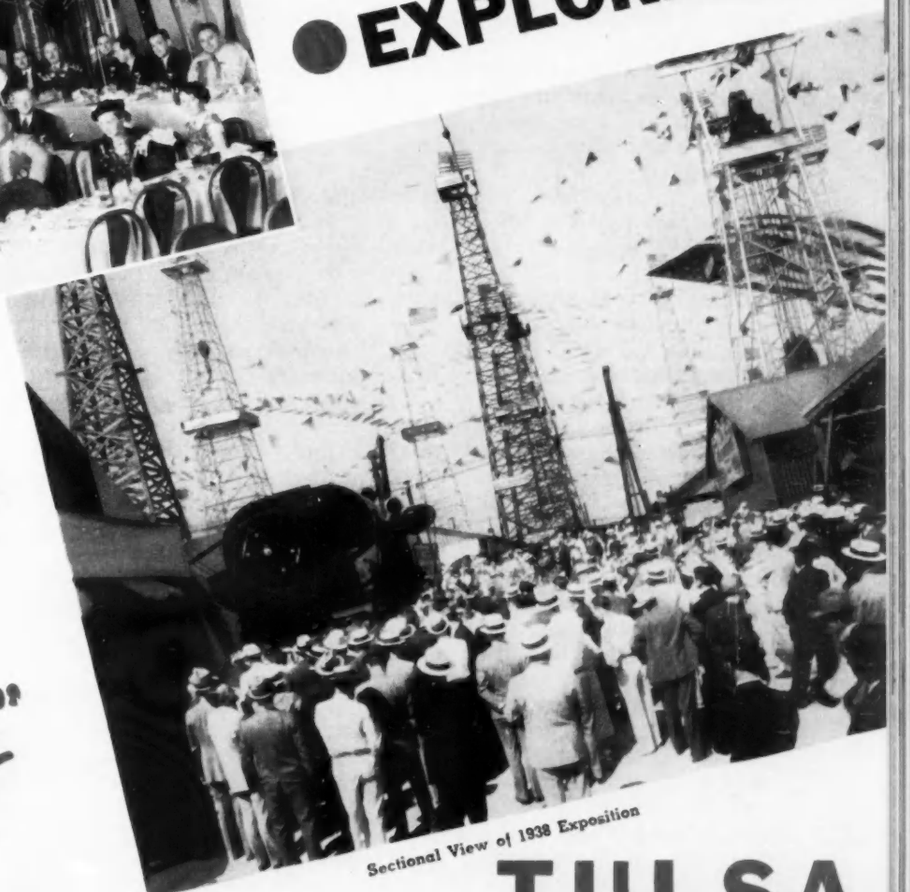


Sectional View of 1938 Exposition

The coming 11th International Petroleum Exposition; biggest and best in its 17 years of history, will hold the greatest educational and practical values for the oil men of the world.

Plan Now to Attend . . . Write for Information
WM. B. WAY, General Manager, Tulsa, Oklahoma, U.S.A.

TULSA
MAY 18-25
1940

INTERNATIONAL PETROLEUM EXPOSITION

Table 4

STATION	DESCRIPTION OF TANKS	Total Capacity in Barrels
El Centro Terminal	Three 80,000 bbls. and three 55,000 bbls. units	405,000
Galan	Two 60,000 bbls. units	120,000
Seven Remaining Stations along line	Two 30,000 bbls., each	420,000
Mamonal Terminal	Fifteen 80,000 bbls., units	1,200,000
Total	37 Tanks	2,145,000

those regularly practiced throughout the world in fields of similar type. The crude is fairly heavy and viscous, and gas pressures and volumes are low, so that most of the wells are necessarily placed on beam shortly after being completed.

The field has one outstanding feature in that it is completely electrified. Power is generated in a central station located at El Centro, which station has a capacity of 7000 KW. Generation is by steam-turbine driven generators furnishing current at 2300 volts, which is then stepped up to 13,200 volts for primary distribution, with later transformation to 440 volts for secondary supply at points of consumption in the field. Power characteristics are 3 phase, 60 cycle, alternating current.

Pumping of wells is performed mainly by individual units at each well, these are driven by V-belts from high torque type electric motors. There are only two "catalinas," i.e., central powers, used in the field, operating 29 wells equipped with conventional surface jacks. Besides these, there are some 27 shallow Infantas wells likewise having surface jacks, but operated by rod lines hooked off individual units on nearby wells. Most of the individual units are skid-mounted, twin-crank type, with double-reduction gears and crank-counterbalances. The electric power consumed by pumping wells averages approximately 0.8 KW per barrel of gross fluid lifted.

Servicing of the pumping wells is performed with two classes of units. For light work, i.e., rod and tubing jobs, use is made of standard single-drum, jaw-clutch hoists powered with 40-horsepower and 60-horsepower electric motors of slip ring design and having compensator control. Electric current for their operation is obtained off a plug connection which constitutes a standard part of the switch box at each well for the pumping motor. These hoists are mounted on trucks equipped with auxiliary dual drive rear ends.

Heavier servicing and cleanout work is performed with caterpillar-mounted, double-drum hoists of conventional design. A complete stock of cleanout and well servicing tools is owned by the company, main items of which are regular bailers, hydraulic bailers, perforation cleaners, and the usual assortment of fishing tools such as spears, swages, wall-hooks, overshots, etc.

Dehydration

Treating of emulsified crude is fast becoming one of the largest problems in local operations, as is indicated by the fact that some 30,000 barrels per day, or roughly half the present total field production, is now being dehydrated. Treatment is through two centrally located plants, one large and one small, and the treating method employed is heat plus chemical. Flow through the plants is entirely by gravity, the heating being performed in field type boilers converted to direct fire-heaters. The chemical is added and the emulsion is then run through vacuum separators where entrained vapors are withdrawn. Afterwards the crude passes through excelsior tanks where free water is separated, and thence to settling tanks wherein the remaining water is allowed to drop out.

Gas Plants

Raw gas from the field is at present handled through five gas plants, three on the Infantas structure and two in La Cira. Four of these plants have compressor equipment only, the gas handled through them being passed through absorbers wherein gasoline fractions are stripped by mineral seal oil, this latter then going back to the main absorption plant at El Centro for distillation. Compressor equipment in the entire five plants consists of 51 low-pressure and 22 high-pressure units, all 180-horsepower, horizontal two-cylinder, two-cycle direct drive type. At present approximately 50,000 MCF of raw gas are being treated daily, yielding around 90,000 gallons of gross gasoline recovery.

Repressuring

The return of gas to the producing formations was started on a small scale in the year 1928, then rapidly increased until in the year 1931, after which it represented one of the largest unit repressuring programs in the world. An average of from 17,000 MCF of gas has been injected daily during the past eight years, which fact would indicate that all measures possible have been taken toward conserving and efficiently utilizing this product.

Original formation pressures in the field when production was first started were approximately equivalent to fresh water head, i.e., 0.43 pounds per square inch per foot of depth. This indicates original averages of about 600 pounds for the C-zone along the upper side of the Infantas anticline, and 850 pounds for the C-zone at the crest of C-zone in La Cira. The pressures at these points in December, 1938, averaged about 350 pounds in Infantas, and 620 pounds in La Cira, which values indicate the highly beneficial effects of gas return.

Refining Practices

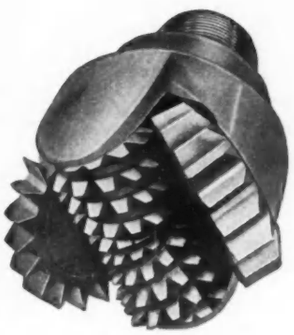
The Tropical Oil Company refinery located at Barrancabermeja, Santander, was started in February, 1922, and gradual expansion, plus modernization, has since been effected as has become necessary to enable refining to keep pace with the growing demand. Selected crudes from Infantas and La Cira are brought to the refinery through separate and special pipe lines. The refining equipment consists of two main units, a combination atmospheric and vacuum installation, and a lubricating oil plant.

The combination unit is the largest contributor to flexibility of operations. Running the first unit separately, i.e., the vacuum and an atmospheric division, permits them to each function as individual stills, and with such procedure they have a combined capacity of 13,000 barrels of crude oil per day. Operating thus, only the light products are topped off the crude, the residuum being a commercial grade of fuel oil. As may be seen, such procedure allows the furnishing of large outputs of gasoline or of fuel oil when the market so demands. The combination operated as a unit supplies all the stocks required for manufacture of asphalts and lubricating oils.

The straight run gasoline is of exceptionally high octane rating, and plant facilities include equipment to ethylize gasoline to meet motor and aviation standards. The refinery also absorbs the major por-

Foreign Operators

REDUCE YOUR DRILLING COSTS WITH H.C.SMITH ROCK BITS



H. C. Smith Rock Bit

Dull cutters can now be replaced with new cutter assemblies in your own shops at a substantial saving*

FEATURES OF THE H. C. SMITH ROCK BIT

1. Triple bearing construction of the gauge cutters eliminates side play of cutters and insures full gauge of hole.

2. Rugged body and superior design cross cutter bearing construction permits high rotational speed and heavy loads—when desirable.

3. Cutter assemblies designed to utilize the maximum cutting surfaces of all individual cutters.

4. More circulation provided through large slush tubes on side cutter and fan-tail circulation along cross cutters prevents "balling" of bit. Large openings around cutters permits quicker displacement of cuttings from bottom of hole.

5. H. C. Smith Rock Bits cut straight holes because the concave construction of the cross cutters allows a cone to form in the center of the hole which acts as a centering guide for the bit.

Fig. 1. Cutting out cross assembly with acetylene torch.

Fig. 2. Replace dull gauge cutters by screwing new gauge cutters on bit body.

Fig. 3. Gauge cutter assemblies being tightened with wrench placed in pin holes.

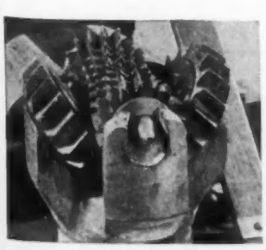


Fig. 4. Cross cutter assembly placed in position, now ready for welding.

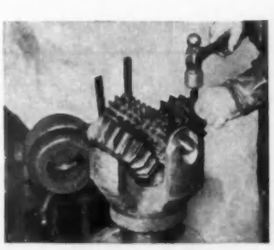


Fig. 5. Placing clearance shims behind thrust washer before welding.

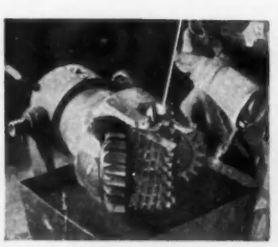


Fig. 6. Welding bit.

Photos at left show procedure for removal of dull cutters and installation of new cutter assemblies.

WRITE FOR DETAILED INSTRUCTIONS

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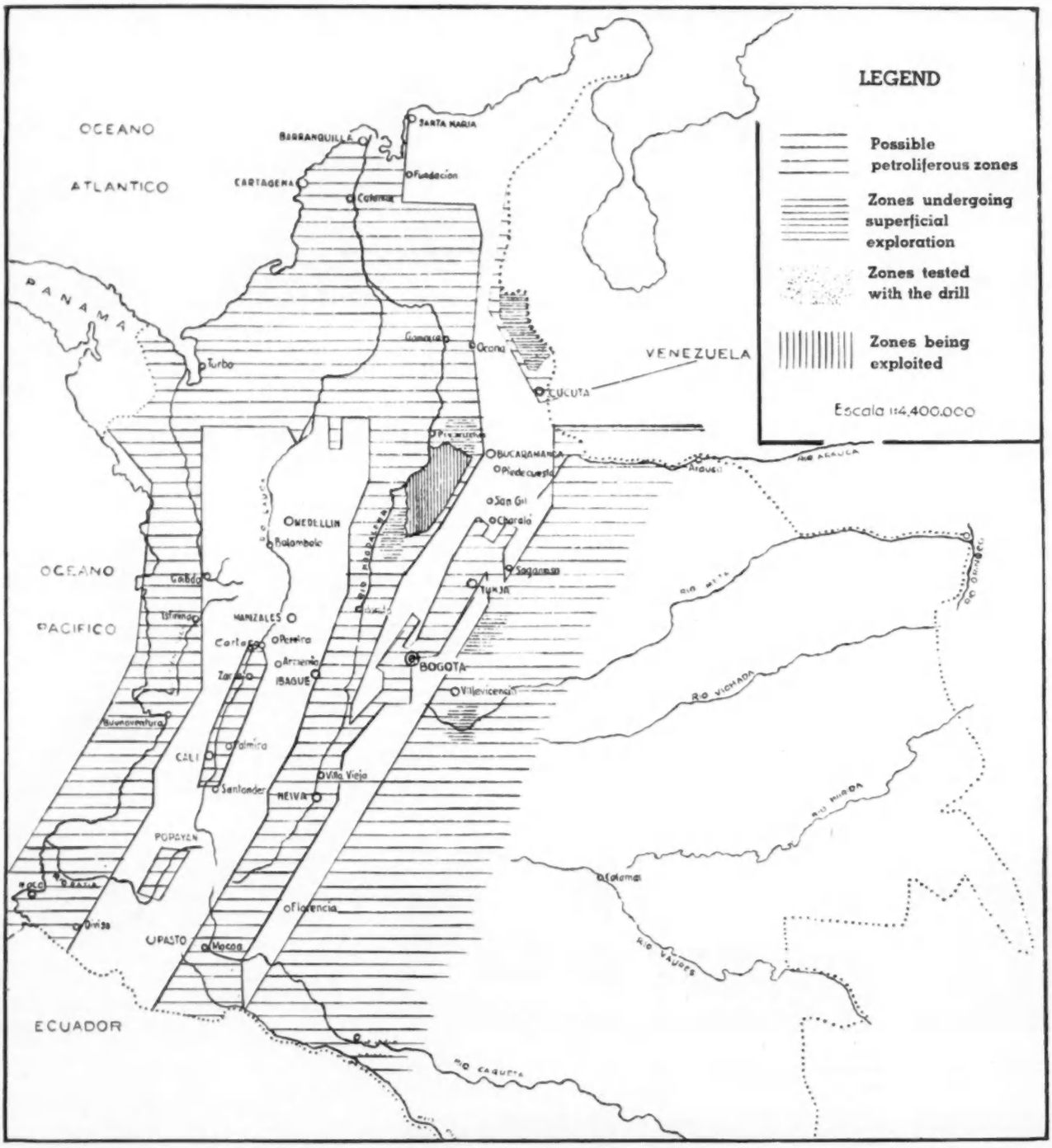
** IN THE UNITED STATES, H. C. SMITH ROCK BITS ARE LEASED AND NOT SOLD*

H C Smith Oil Tool Co.

GENERAL OFFICES AND PLANT - P.O. BOX 431, COMPTON, CALIF.



Petroliferas zones of Colombia as recognized by the authors.

tion of natural gasoline production from gasoline plants in the field. which product is likewise shipped to the refinery through a special and separate line from the field.

Lubricating stocks are treated through the phenol plant, which solvent method was developed by the Imperial Oil Company, Limited, in its Canadian refineries. Treated stock is re-run to secure the cuts used in blending the finished oils, with which process a variety of motor oils is produced throughout the range from 20 to 60 S.A.E. grades.

Several grades of asphalt are refined, such as those required for road construction and for other uses. The oxidation plant wherein such products are manufactured operates on the asphalt cut from the vacuum unit.

A small but adequate complete canning plant is likewise operated in connection with the refinery. This unit packages in suitable containers the various grades of lubricating oil manufactured, as well as the portions of gasoline and kerosene, which are shipped in five-gallon tins. Most of these latter two products are transported in bulk or in drums; however, it is necessary to furnish some of the inland ports with cases and cans.

Transportation

Transportation of petroleum produced in the field is comprised of

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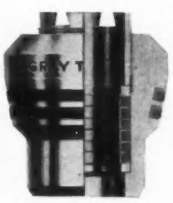
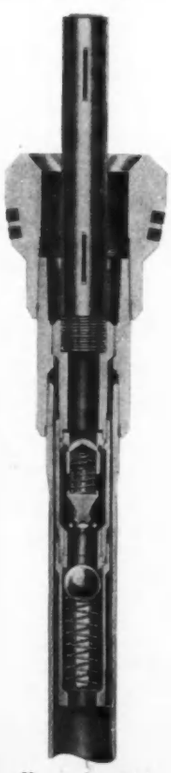


No. 7—H. W. Type Tubing Hanger



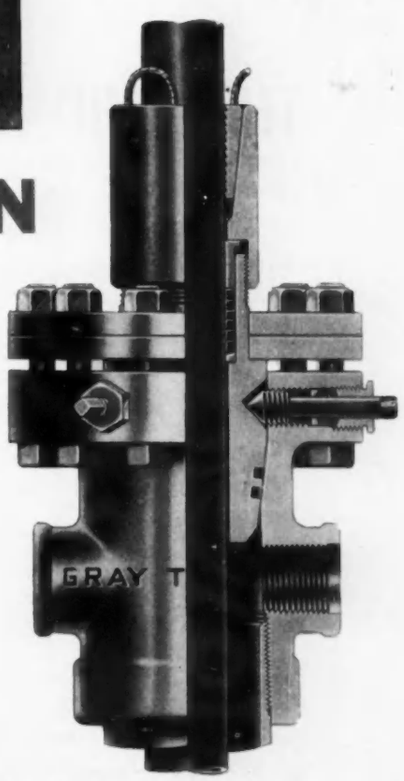
No. 4—Canfield Bushing Tubing Hanger with Check Valve

AT COMPLETION

because Gray "Series" Tubing Heads allow completion in any desired manner, including:

- **Latest practices for washing wells**
- **Multiple zone completion**
- **Setting formation and production packers**
- **Tubing operations under pressure before and after completion.**

PLUS NUMEROUS OTHER DESIRABLE OPERATIONS



Gray Series Tubing Head . . . flanged onto Casing Head and in which any of the hangers shown on opposite side of this ad may be used.

SEE THE GRAY SECTION IN THE 1940 COMPOSITE CATALOG

GRAY TOOL COMPANY

HOUSTON – TEXAS

WEST COAST DISTRIBUTORS

WAGNER-MOREHOUSE, INC.

LOS ANGELES, CALIFORNIA

Get acquainted with REAL pump performance!

THE FLUID PACKED PUMP LINE,

TYPE FOR TYPE, REPRESENTS THE FINEST PUMP CONSTRUCTION YOU CAN BUY!

● That's a mighty big statement. But if you've ever seen the exacting care that goes into the manufacture of *each* Fluid Packed Pump part . . . if you've seen the unusually rigid tests we make on *every single* valve ball and seat (not on just a few samples out of a batch) . . . if you've seen the inspection after inspection we give each individual part—then each assembled unit—and finally each complete pump . . . *you know that we're talking facts.*

● One way to prove to yourself that these *are* facts is to first select the Fluid Packed Pump that suits your particular job. That's easy because there's a type made to meet every pumping condition. Then install it in your well and keep accurate records of its performance. Compare these records with those made by any other make of pump you have used under similar pumping conditions. *You'll see that Fluid Packed Pumps out-last . . . out-perform . . . and out-economize other pumps on all types of work, easy or tough!*

● Why not start now to cut pumping costs and increase your efficiency with Fluid Packed Pumps? Here's a round-up of the Fluid Packed Line for easy selection to meet your needs. And your local Fluid Packed Pump representative will be glad to supply further information and make recommendations.

Write for illustrated catalog!

Fluid Packed Pumps are described in the Composite Catalog, pages 670 to 675!

"Improved Insert" Flupaco Pump is the newest addition to the Flupaco line. Its *one-piece Hardened and Honed alloy-steel* barrel assures rigid alignment under all conditions. It has no joints to leak or liners to break, and will stand repeated rehoning. Also furnished in non-corrosive material.

"Tubing Liner Pump" embodies the latest design and construction features. Because of higher quality it will reduce pumping costs on all wells where tubing liner pumps can be used. The automatic Standing Valve Puller insures against loss of the standing valve body when running in or out of well.

...Volume Producer." Quick ...stallation, simple design ...ant maximum cross-sec... ...ons displacement are ...outstanding features ...f this pump. A precision ...mp for use in large vol... ...ms wells, it is long-wear... ...ly easily serviced.

"Petrol A." A low priced precision built pump for use in stripper wells, designed to reduce pumping costs to the core. Like all other FLUPACO Groove Seal Pumps, it conforms to A. P. I. specifications.

"Producer." An insert pump for wells of medium volume and depth. Has plungers of "Service" or "Supreme" alloys—wear-resistant and durable. Also has largest cross-sectional area available in insert construction.

"Positive Pull Type." For general pumping conditions, this pump is recommended wherever the insert feature is desired. The entire assembly goes in and comes out on the rods, giving positive pulling action.

"Removable Type." This pump is equipped with a manually operated hook-on device that enables the operator either to pull the standing valve and seat or leave them in place when pulling the traveling tubes.

"Rigid Type." Recommended for extreme sand or viscous oil conditions, this pump is securely anchored to prevent its pulling off the seat. Only the traveling tubes come out on the rods, assuring positive hold-down efficiency.

"Marginal." For pumping marginal or low volume wells in which severe sand conditions prevail, this pump has all the features of the "Positive Pull" type, plus extremely low maintenance costs.

PUMP COMPANY

...PACKED PUMP CO... S.E. 29th St., Oklahoma City 9 GULF COAST WEAR...

two divisions; (1) the shipping of refined products from refinery to points of consumption throughout the country, and (2) the transporting of the remaining portion of crude from field to coast, for later shipment to the exterior by ocean tankers.

The refined products are transported from Barrancabemeja aboard river boats, a complete fleet of which type vessels is owned and operated by Tropical Oil Company. Fuel oil, part of the lubricating oils, and a portion of the gasoline production are handled in bulk in specially constructed barges, these also company-owned.

Delivery is made into tanks at strategically located bulk stations along the river, with final delivery to consumers being effected from these stations by the sales department of the Tropical organization. Packaged goods are likewise delivered to the bulk stations and thence distributed to dealer stations further within the interior.

Oil Geology of Colombia

The knowledge of the geology of the country, and especially of the petroliferous regions, located for the most part in low, tropical lands, is still too general to permit a satisfactory determination of the oil-bearing areas. This writing and the map which accompanies it should be considered only as an attempt in such a direction.

The rocks of Colombia can be divided into two great groups: the crystalline basement and the blanket of Cretaceo-Tertiary. The basement is characterized by metamorphic, igneous and sedimentary rocks, among which it has been possible to establish the age of certain ones of the Paleozoic. The blanket comprises, in large part, of clatic rocks of the Cretaceous and of the Tertiary, which have a thickness of several thousand meters, and which characterize the marine transgression which, at the beginning of the Cretaceous, started filling the Andean geosyncline and extended over the basement rocks.

Distinguishing, thus, between basement and blanket, the first of these groups occupies the following zones of the country:

1. The littoral zone of the Coast Range that extends from Cape Corriente to Panama.

2. The Western Cordillera throughout its extent from Ecuador to 7° 30′, more or less, north latitude.

3. The Central Cordillera, also throughout its extent from Ecuador to 8° north latitude.

4. The Sierra Nevada de Santa Marta and the major part of La Guajira.

5. Some parts of the Eastern

Table 5
Catatumbo—Wells Completed

Structure and Number	COORDINATES North	COORDINATES East	Elevation Meters	DATE Initial	DATE Final	Total Depth, Feet	Zone	Initial Production Bbls. Day	A.P.I. Gravity	REMARKS
Petrolea 1	512,273.33	482,612.57	.....	1933—Febr. 9	1933—March 6	490				Cut Fire and burned.
1-A	511,158.25	484,935.10	.....	1933—Aug. 2	1934—Aug. 31	3008	3	1200	47.0°	
2	509,045.00	484,585.00	35.50	1934—Jan. 31	1934—May 5	708	2	2000		
3	501,035.88	484,460.41	82.39	1935—June 25	1935—Dec. 5	1329		S. W.		Abandoned
4	511,129.18	485,939.25		1934—June 4	1934—Nov. 20	2102	3	50		Actual Depth, 1850′
5	505,194.04	485,150.72	47.85	1934—Sept. 21	1934—Dec. 29	2640	3	S. W.		Dry and Abandoned
6	511,241.56	485,432.35	49.44	1934—Dec. 4	1935—Febr. 28	1041	1	—		
6-A	511,239.78	485,414.09	82.88	1935—March 12	1935—June 19	1623				Actual Depth 1340
7	508,137.80	483,854.19	61.35	1935—Jan. 11	1935—April 18	1467	3	1150		
8	509,682.49	483,881.45	68.42	1935—Sept. 7	1935—Dec. 16	558	1	1038		
8-A	509,676.63	483,853.42	69.03	1936—Jan. 19	1936—March 6	675	2	722		
9	513,241 72	485,536.98	69.10	1935—Dec. 18	1936—Jan. 17	951	1	2825		
10	514,784.44	485,281.02	72.65	1936—Dec. 31	1937—Febr. 2	1053	1 and 2	1625	44.8°	
11	498,947.90	484,320 03	88.35	1936—May 9	1936—July 30	1415	3	S. W.		Dry and Abandoned
12	507,545.25	484,433.44	67.25	1936—July 31	1936—Nov. 25	1602	2 and 3	463		
13	499,947.98	484,434.00	85.58	1936—Aug. 18	1936—Oct. 13	1374		S. W.		Abandoned
14	497,073.50	484,798.97	102.77	1936—Nov. 22	1936—Dec. 30	832	3	S. W		Abandoned
15	508,030.46	485,347.62	69.82	1937—Febr. 24	1937—May 6	1327	2 and 3	600	45.6°	Production From Zone 3
16	500,576.14	484,206.35	87.82	1937—May 7	1937—Aug. 4	1350	3	174	37.7°	
17	503,994.07	485,546.46	102.86	1937—Aug. 5	1937—Oct. 16	2338		Dry		Dry
18	511,625.22	484,052.89	57.84	1937—Dec. 14	1938—Jan. 9	460	Ostrea	1440	40.1°	
19	513,160.00	484,373.00	59.76	1938—Febr. 5	1938—March 20	519	1	3888	44.0°	
20	513,606.21	484,774.48	71.23	1938—March 14	1938—April 28	630	1		44.2°	
21	513,186.55	484,720.00	69.37	1938—April 7	1938—May 20	550	1			
22	513,133.56	485,113.98	82.70	1938—May 30	1938—July 5	705	1	2437	43.2°	=362,000 cu. ft. Gas/Day
23	514,020.00	484,505.00	63.33	1938—May 14	1938—June 18	803	1	1560	41.3°	
24	512,458.93	484,197.16	62.45	1938—June 20	1938—Aug. 31	440	Ostrea	1176	42.4°	
25	510,815.50	484,303.40	72.80	1938—July 15	1938—Aug. 23	542	1	4560	46.3°	=400,000 cu. ft. Gas/Day
26	510,744.30	484,707.20	76.41	1938—July 3	1938—Aug. 27	1020	3	486	44.9°	
27	512,389.95	484,601.67	66.88	1938—Aug. 26	1938—Nov. 4	549	1	2981	45.2°	=540,000 cu. ft. Gas/Day
28	512,306.22	484,982.57	64.60	1938—Nov. 17	1938—Dec. 11	654	1	1782	42.7°	
29	511,601.60	484,452.20	61.70	1938—July 24	1938—Aug. 31	509	1	1721	45.6°	
30	511,532.20	484,846.10	67.90	1938—Sept. 6	1938—Oct. 9	712	1	1056	42.2°	=120,000 cu. ft. Gas/Day
31	510,887.28	483,918.82	68.25	1938—Aug. 29	1938—Sept. 28	495	1	4187	45.2°	=360,000 cu. ft. Gas/Day
32	509,936.80	484,564.80	62.56	1938—Oct. 10	1938—Nov. 29	615	2	259	47.1°	=25,000 cu. ft. Gas/Day
33	509,809.70	485,354.70	86.27	1938—Dec. 18	1939—Febr. 3	948	1	1199	39.3°	
34	510,007.37	484,177.37	61.71	1938—Sept. 12	1938—Oct. 30	505	1	2446	46.6°	=370,000 cu. ft. Gas/Day
35	508,395.53	484,293.00	61.24	1938—Oct. 23	1938—Nov. 27	680	1	2005	41.3°	=250,000 cu. ft. Gas/Day
36	510,694.55	485,104.55	84.18	1938—Nov. 5	1938—Dec. 8	810	1	4212	42.2°	=550,000 cu. ft. Gas/Day
40	510,097.06	483,811.16	60.77	1939—Jan. 8		504	1	1690	46.5°	=750,000 cu. ft. Gas/Day
42	509,029.69	485,217.18	77.98	1938—Dec. 6	1939—Jan. 16	880	1	842	40.4°	=100,000 cu. ft. Gas/Day
45	512,107.00	483,912.00	54.37	1939—Febr. 13	1939—March 4	436	Ostrea	2044	42.1°	
46	508,774.68	484,359.86	73.41	1938—Dec. 22	1939—Jan. 24	663	1	910	43.0°	
47	510,336.48	484,630.18	74.14	1939—Jan. 18	1939—Febr. 9	615	1	2790	46.2°	
50	508,844.14	483,965.94	67.41	1939—Febr. 5	1939—Febr. 28	677	1	2790	41.6°	
Rio de Oro 1										
2	572,330	446,600	203.5	1935—Apr. 25	1936—July 1	6717				Abandoned
3	572,907	445,531	101.33	1936—March 6	1937—July 27	6317				Abandoned
4	581,758	450,785	117.72	1937—July 17	1937—Nov. 6	1615	Catat.	142	38.6°	
5	581,085	450,715	112.71	1937—Nov. 7	1937—Dec. 29	1332	Form.	3806	37.7°	
6	580,900	450,897	185.80	1937—Dec. 31	1938—May 10	1610		2070	38.9°	
7	582.654	451,065	36.83	1938—March 3	1938—Sept. 12	1333	"	Dry		Abandoned
8	580,296	450,566	50.45	1938—July 22	1938—Aug. 22	1170	"	2736	39.5°	1,250,000 cu. ft. Gas/Day
9	580,615	450,437	90.06	1938—Sept. 19	1938—Dec. 9	1455	"	383	32.5°	2% S. W.
Leoncito 1	491.492 85	487.054.37	334.42	1937—Sept. 21	1938—April 7	3045	"			Abandoned

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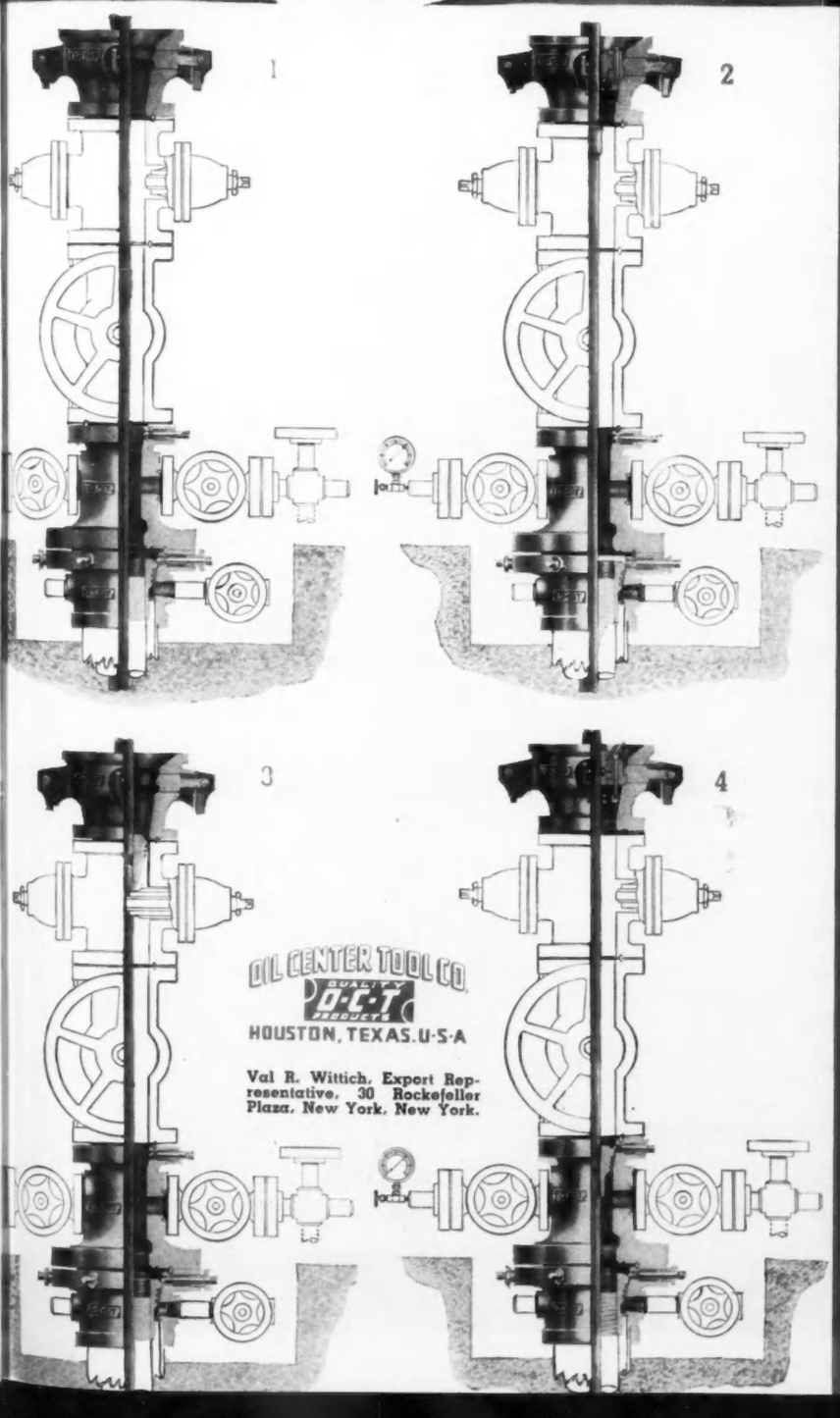

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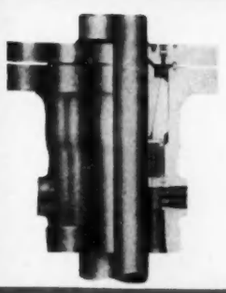

Cross-section view of O-C-T Type C-9-C Slip Suspension Casing Head with Welding Flange as shown in the Christmas tree photograph above.

This simplified method of well completion has been adopted as regular routine by a number of operators in deep, high-pressure Gulf Coast and Mid-Continent fields. (La Blanca, 4100 lbs. pressure; Premont, 3300 lbs. pressure; Fairbanks, 2700 lbs. pressure; Schuler, 2100 lbs. pressure, and others.) Cross-section drawings at left illustrate, step-by-step, this widely used completion method, which also applies to O-C-T types T-20, T-25 and T-26 Tubing Heads. And while O-C-T Type C-8 threaded hanger type Casing Head is illustrated, O-C-T Type C-9-C Casing Head, shown above, is generally used to suspend and seal long, heavy strings. Type C-9-C Head is provided with neoprene packing below slips, which effects pressure tight seal the instant pipe is landed on slips. Welding casing to welding flange effects seal above slips, and R.P.I. ring gasket seals between flanges. An unusual feature of this head is a provision for testing the weld. A ⅛" hole is drilled through welding flange and tapped for a ½" pipe connection to permit application of hydraulic pressure for testing the seal. Testing apparatus is small and compact, weighing less than 20 lbs.

1. With "T-16" Tubing head installed on casing head and conventional master gate, ram type blowout preventer and O-C-T Blowout Preventer flanged above, well is drilled in.

2. After drilling in, stripper type packoff is inserted in O-C-T Preventer to permit running tubing to bottom under pressure. Stripper packoff readily passes pipe collars, yet effectively holds well pressures.

3. With ram type preventer closed around tubing, stripper packoff is removed from O-C-T Preventer to permit passage of tubing hanger, which is lowered enough to clear this preventer and permit regular type packoff to be inserted.

4. Then, with O-C-T Preventer providing blowout protection, ram type preventer is opened to permit tubing hanger to pass to its seat in Tubing Head. Making up lock-down screws forces tubing hanger to seal, thus permitting removal of all blowout preventer equipment and installation of top half of Christmas tree. With complete Christmas tree installed and flow line connections made, well is ready to be washed in.

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Cordillera: near Ocaña; to the north of Bucaramanga; on the eastern flank of the Cordillera, and at the headwaters of the Magdalena River.

6. These rocks probably are to be found present in the southwestern part of Colombia, that is, in the regions of Vaupés, lower Caquetá and Putumayo.

Since the basement consists of igneous and metamorphosed sedimentary rocks, it contains no petroleum, and the blank areas that are conspicuous on the map indicate, generally speaking, the areas lacking this raw material.

The blanket contains petroliferous horizons in the Cretaceous and in the Tertiary. The Cretaceous, predominant in the eastern Cordillera, has been proved to be oil bearing in the lands of the Barco concession in the Maracaibo basin. The Cretaceous period was one of prolonged submergence in this part of the continent, and an enormous series of strata formed whose total thickness is close to 6000 meters. Cretaceous sediments are found in relatively small zones about the Sierra Nevada de Santa Marta, in the northern part of the Western Cordillera, in La Guajira, and on the Pacific Coast.

The petroliferous Tertiary occupies the middle portion of the Magdalena Valley, the low lands of the valley of the Cesar River, the northern part of the Department Norte de Santander, the depressions of the Eastern Cordillera and the margin of the eastern plains or Llanos, the Atlantic coastal plain, the sides of the Cauca and Patía valleys, and the low lands that extends from the littoral zone of Nariño to that of the Chocó.

Structure

The Andes of Colombia, formed during the Tertiary can be divided into two great sections: the piedmont plain of the Llanos and the mountainous zone proper. It appears that the Llanos have suffered only a gentle contraction, while the mountainous zone is found to be strongly folded.

The mountainous zone, properly speaking, is divided into four branches, which are: the Coast Range, the Western Cordillera, the Central Cordillera and the Eastern Cordillera, separated respectively by the valleys of the Atrato-San Juan, the Cauca and the Magdalena. In general it appears that the Cordilleras correspond to horsts and the valleys to grabens.

The Coast Range represents the eastern flank of an anticline whose axial zone is found in the zone of basement rocks that extends from Panama to Cape Corrientes, and which then outcrops at the island of Gorgona.

The Western Cordillera extends frm Ecuador to approximately 7° 30′ north latitude, where it abruptly disappears in part beneath the sediments of the blanket which form the Atlantic Coastal plains. The western branch of this range after undergoing a marked depression in the lower Atrato, rises to form the Cordillera that continues through Panama and Central America.

The Central Cordillera is the proper geologic axis of the Colombian Andes; it comes from the massif of Ecuador, it is strongly depressed at a latitude of approximately 8° north where it is covered by the sediments of the Atlantic coastal plains from which it emerges to the north to form the Sierra Nevada de Santa Marta.

The Eastern Cordillera separates from the Central at the head of the Magdalena River, and at approximately 7° north latitude splits into two ranges: the Serranía de Mérida which runs toward the northeast, and the Serranía de Perijá which runs north; between them lies the basin of Maracaibo. The Serranía de Perijá plunges in La Guajira, while the Serranía de Mérida continues towards Venezuela and Trinidad, where it swings more towards the north, forming the arch of the Antilles.

Petroliferous Areas of Colombia

In order to discuss the petroliferous possibilities of Colombia, the country may be divided into the following zones or regions:

1. Atlantic Coastal Plains.
2. Magdalena River Valley.
3. Cesar River Valley.
4. Interior area of the Eastern Cordillera.
5. Eastern Plains (Llanos).
6. Caquetá and Putumayo District.
7. Maracaibo Basin.
8. Cauca-Patía Trough.
9. Pacific Coastal Plains.

Atlantic Coastal Plains

Atlantic coastal plains are here considered to be the region that extends along the coast of the Caribbean Sea, between the Atrato and the Magdalena River, and limited to the south by a line that connects the mouth of the Atrato River with the town of El Banco. It is an essentially flat area, in which the rocks exposed vary from the lower Tertiary to Recent, the older rocks being found, in general, toward the south, and the younger to the north, although all are strongly folded.

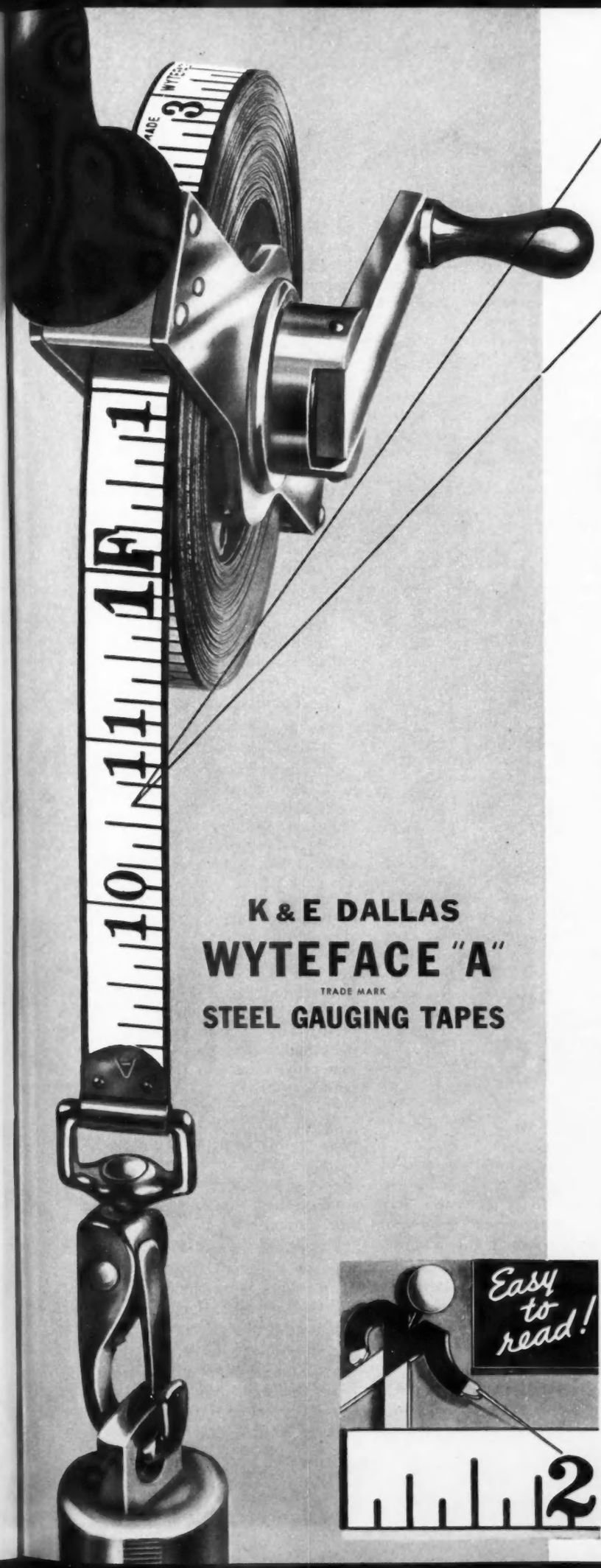
Numerous oil seeps and mud volcanoes are known in this region, and these have made it attractive for detailed prospecting. The littoral zone included between Cartagena and Barranquilla, the line of San Andrés-El Carmen, and the valley of the Sinú River have been investigated by drilling without satisfactory results. The drill holes made several years ago, reached only moderate depths, and many of the wells were located on the basis of surface manifestations of oil, without having made a study of the structure of the rocks lying below the Recent covering.

Although the drill holes completed in this region up to now have given no results, due to the great number of oil seeps, to the presence of favorable structures for its accumulation, and to its privileged geographic position, it is to be hoped that test wells based on more detailed studies will demonstrate the possibility of developing oil fields of importance.

Magdalena River Valley

The valley of the Magdalena is a long, narrow belt that corresponds to a basin of deposition bordered on both sides by the Central and Eastern cordilleras, and covered in the major part by Tertiary sediments. It can be divided into two sections, separated from one another by a constriction: the section of the upper Magdelena between Honda and the headwaters of the river, and the Cesar River.

With reference to the search for oil, the section of the middle portion is the one that has excited the greatest interest, and it already has been proved with excellent results in the concession of Tropical Oil Company. Here, in an area of about 12,355 acres, there is obtained annually around 20,000,000 barrels of oil, produced from the Tertiary, a quantity that has not



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been larger because of the reduced capacity of the pipe line.

On the other hand the holes drilled to the north and south of this concession have not given definitely favorable results. This does not indicate that there is not oil in commercial quantities, inasmuch as investigations outside of the De Mares concession are in their beginning, and it is expected that they will give better results after new wells are drilled based on careful geological studies which various companies that have concessions in this region are carrying on forward at the present time.

Cesar River Valley

Geologically speaking, the valley of the Cesar River may be considered as the northern prolongation of the Magdalena River valley. Like the latter, it is covered with Tertiary sediments, which are found to be affected by diastrophic movements that certainly will have formed structures favorable for the accumulation of oil. Notwithstanding, the valley is practically unexplored, and it is hoped that a careful study will confirm the idea of there being a zone attractive from the point of view of petroleum.

Interior Area of the Eastern Cordillera

In the Eastern Cordillera itself, there exist basins of sedimentation, like that of the Sabana of Bogotá, and the Tunja-Paipa trough. Here the blanket sediments reach considerable thicknesses, and manifestations of oil are to be seen near structures favorable for its accumulation, making this zone possibly petroliferous.

Eastern Plains (Llanos)

The extensive region drained by the Orinoco River and its tributaries, and situated to the east and southeast of Bogotá on the eastern side of the Eastern Cordillera, is named the Eastern Plains or Llanos. Due to its geograpic situation and to the fact that the major part of the terrain is covered by Pleistocene and Recent deposits, it is hardly more than natural that the geology of this region should be practically unknown.

Numerous oil seeps are known on the eastern flank of the Cordillera, and it is said that some also exist in Arauca and Vichada. It is generally believed that the rocks that are found in the sub-surface may be the same or similar to those encountered in the Eastern Cordillera, and in the plains of Venezuela, to the south of the Serranía de Mérida.

The Llanos have finally attracted the attention of various oil companies, and to judge by the preliminary studies of surface geology and of geophysical prospecting, attractice structures exist.

Results of the wells that soon are to be drilled will demonstrate to what point this region will influence and determine the position of Colombia as a world reserve of petroleum.

Caquetá and Putumayo District

Caquetá-Putumayo region is situated immediately to the south of the eastern plains, on the east side of the Eastern Cordillera. Like the Llanos, geologically it is almost unknown, and its exploration is still more difficult than that of the Llanos owing to the thick tropical forest that covers almost all the region. It is believed, as well, that in a large part of it may be found exposed blanket sediments, from which originate the many seeps that are known.

For these reasons it is not possible to make an estimate in respect to the oil reserves of this important territory.

Maracaibo Basin

The Maracaibo trough corresponds to a basin of sedimentation situated between the Perijá and Mérida ranges. The northern part of the basin, well known in the Venezuelan portion, has been demonstrated to be highly productive, both in the Tertiary and in the Cretaceous. Part of this trough continues towards Santander del Norte, in Colombian territory, where the Barco concession is located.

Drilling which Colombian Petroleum Company is carrying on at present in this concession, has fully demonstrated that it is one of the most promising oil fields of the country. Two structures have been proved to date: La Petrólea and Río de Oro, both with satisfactory results. The oil of La Petrólea is of paraffin base, and is found in Cretaceous rocks.

It is probable that to the south and to the west of the concession the same source rocks occur and favorable structures may be found in those regions.

Cauca Patía Trough

The valley of the Cauca-Patía comprises the upper reaches of the Cauca River and the headwaters of the Patía River, situated between the Western and Central Cordilleras. Geologically speaking, the two valleys constitute a single structural trough within which is found a cap of Tertiary sediments. It is very probable that, at least in part, these sediments are marine, and due to the presence of anticlinal structures, the possibility that they contain petroleum is favorable. It is important to note that some oil seeps are known, and the presence of bituminous shales is proven.

Notwithstanding, this is only a possibility, and the definite proof of whether or not exploitable beds exist in the Cauca-Patía valley, cannot be made without resorting to exploratory drilling on the existing anticlines.

Pacific Coastal Plains

The Pacific area has been tested in the northern littoral zone of Perú, and in the coast of Ecuador, and the results of the drill have demonstrated a fair productivity. On the other hand, the wells drilled in Panama have demonstrated the sterility of that region. The Colombian zone of the Pacific Coast has not been tested with the drill. Seeps are restricted to the shore zone of the Department of Nariño and to the region at the head of the San Juan River. The government commission that explored the zone between Buenaventura and Cupica, arrived at the conclusion that there was no evidence in respect to the presence of commercial quantities of petroleum, at least in this region. In view of the results obtained up to now, it may be said that the coastal plain of the Pacific has fair petroliferous prospects in the littoral zone of the Departments of Nariño and Cauca.

Reviewing what is said regarding the value of the petroliferous areas, there is apparent their great extent and the lack of careful study of zones other than those of the Magdalena Valley and of the Maracaibo Basin and their testing with the drill, which will determine the true petroliferous value of such zones.

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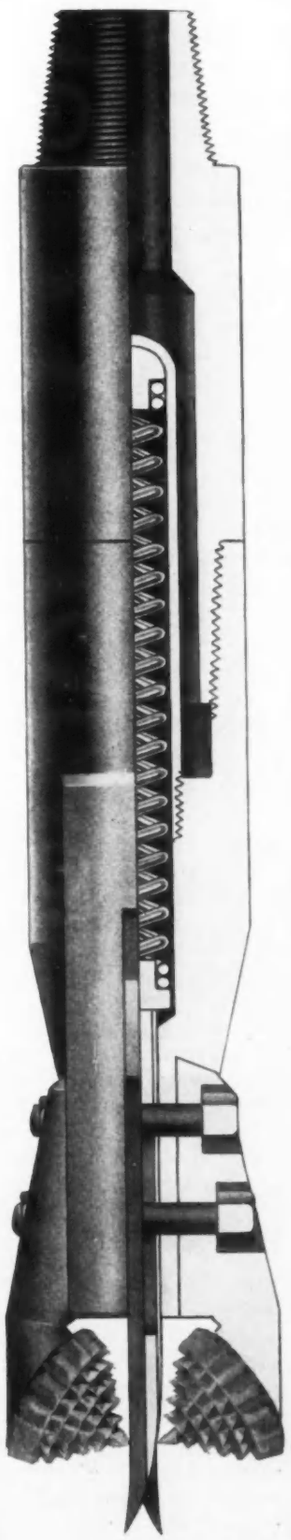

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Late Prospecting Brightens Outlook for Paleozoic Oil in Western Europe

There is a broad belt extending from England across Belgium and the Netherlands into Germany with geological features similar in many respects to those of the Appalachian region of America in which several important oil fields are located. Disregarding a heavier overburden in the European region, that similarity will continue to cause exploratory drilling until definite conclusions have been reached.

By W. A. J. M. VAN WATERSCHOOT VAN DER GRACHT
Dr. jur., D. Sc., M. E. Wylre, Netherlands

EXPLORATION for Paleozoic oil in western continental Europe, to the east of the North Sea, in conjunction with similar work in progress in England, on the other side, is increasing our knowledge of the deeper subsurface of northwestern Europe and may finally express itself in commercial success.

We have found enough to justify continued search.

As readers of The OIL WEEKLY may remember, I have for a number of years advocated the possibility (nothing more) that in the foreland of the late-Paleozoic Variscan mountains of Europe, very much as in that of the almost identical Appalachian mountains of North America, petroleum could be expected in workable quantities at an appropriate distance away from the belt of strong folding and overthrusting in the actual mountain chains.

Here in Europe this foreland region is very similar to the oil-area of Pennsylvania and West Virginia. On both continents we have a thick series of brackish to fresh water coal measure deposits, overlying marine lower-Carboniferous and Devonian. In the belt where over-strong folding has died out well known oil deposits occur in America, whilst in Europe oil indications are also found all the way from the English Midlands, over the eastern Netherlands, to Westphalia. This theory was announced at the Paris meeting of the Second International Mining Congress, 1935, and also published in the Bulletin of the American Association of Petroleum Geologists, 1936, pp. 1476-1493.

Exploration Difficult

There is an additional difficulty in Europe in that the coal measure rocks (which outcrop in Pennsylvania and West Virginia, and the structure of which can be observed and surveyed) are on the European continent buried under an increasing thickness of Cretaceous and Tertiary, an overburden which soon reaches 3000 feet and beyond—very thick and not otherwise very appropriate for geophysical work. In consequence, the difficulty of exploration is very great here, and this explains why so little has been done thus far.

But with improvement in deep drilling technique and geophysical methods, additional work was undertaken on the European side and some promising results obtained—so much so in fact that the actual presence of Paleozoic petroleum in this belt is now proven, and the only point to clear up further is whether we can discover workable oil fields.

As in America, the source rock is not in the coal measures. These only contain reservoir rocks (sandstones). The source of such bitumina as are now known to be present is in marine strata of lower-Carboniferous and Devonian age. In addition, this region in Europe contains a widespread Silurian formation, consisting of a great thickness of black shales, which certainly must once have been, and possibly still are, a promising source rock. Much depends on the nature of the sandstones, whether these are sufficiently porous to contain a large volume of oil and/or gas. In Westphalia sandstones are found to be largely mineralized by a siliceous, or in other instances carbonaceous, cement more or less completely filling the original pores. If no sufficiently porous rocks exist, there cannot occur any considerable accumulation of oil. But only the drill can find out for us whether such rocks predominate. There seems no cogent reason to assume as a foregone conclusion that Carboniferous rocks should be more heavily mineralized in Europe than much older Paleozoic rocks (Ordovician!) in America—provided they are in a belt sufficiently distant from an orogeny of importance.

Area Limited

Vingerhoets et al have been found willing to test the above possibilities and explore for oil in a belt sufficiently far to the north of the Variscan mountain front. While the front extends from England to central Germany, the appropriate area is limited in extent. A large region in Belgium and England is

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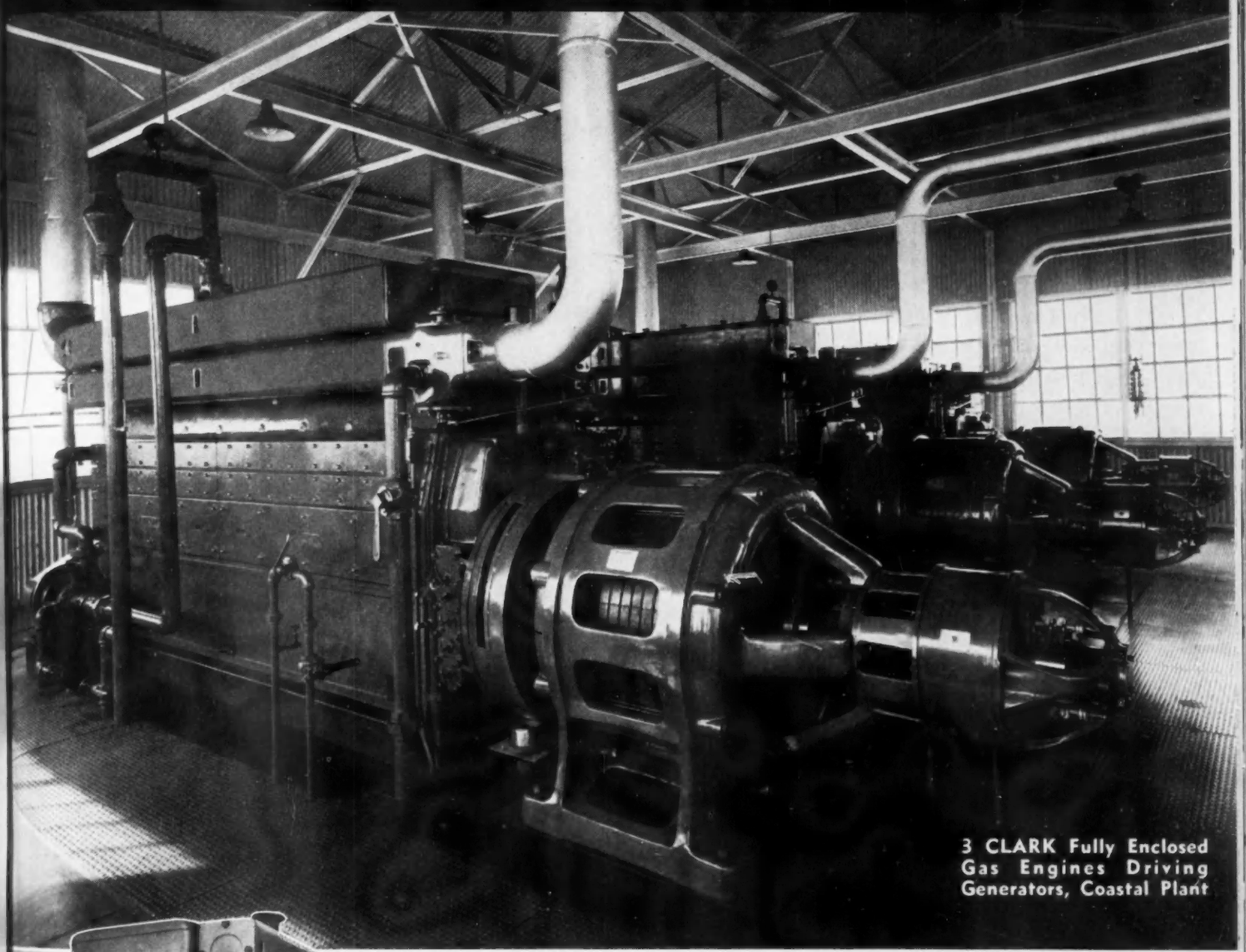

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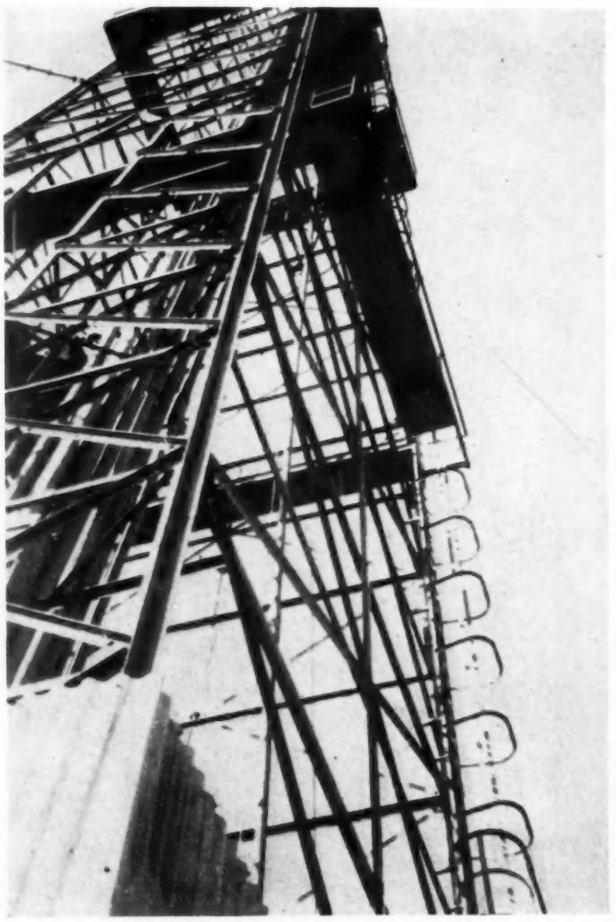
TEST IN SWISS ALPS PROJECTED TO 12,000 FEET

A COMPLETELY electrically equipped wildcat is drilling near Neufchatel, Switzerland, under the superintendency of Herr Van der Werden, who got his training in America. Vingerhoets Company of Belgium is doing the drilling.

The test, projected to 12,000 feet if necessary, is on a secondary fold in the Swiss Alps. It started out by taking 12-inch cores and later was reported taking 6-inch cores consisting chiefly of Jurassic limestone, marble, indurated limestone (quartzite) and dolomite.

Some oil and gas shows have been reported.

Presented here are three views of the heavy-duty rotary being used. Including the substructure, the derrick is 190 feet high.



underlain by the Brabant Massif, where only pre-Carboniferous rocks of no promise as reservoirs occur below the Cretaceous. In the Netherlands the depth becomes excessive in the promising belt on account of enormous Mesozoic and Tertiary deposits of the North Sea Basin. There is a high elevated fault-block, the Peel-Horst, (beginning about 40 kilometers east of the eastern end of the Massif) where the coal measures were reached by the writer as workable depths, (and will gradually be worked in collieries), but here the Carboniferous was found as devoid of oil indications as in the Dutch South Limburg coal field and the Belgian Campine collieries. Evidently we are still too close to the folded chains in that area.

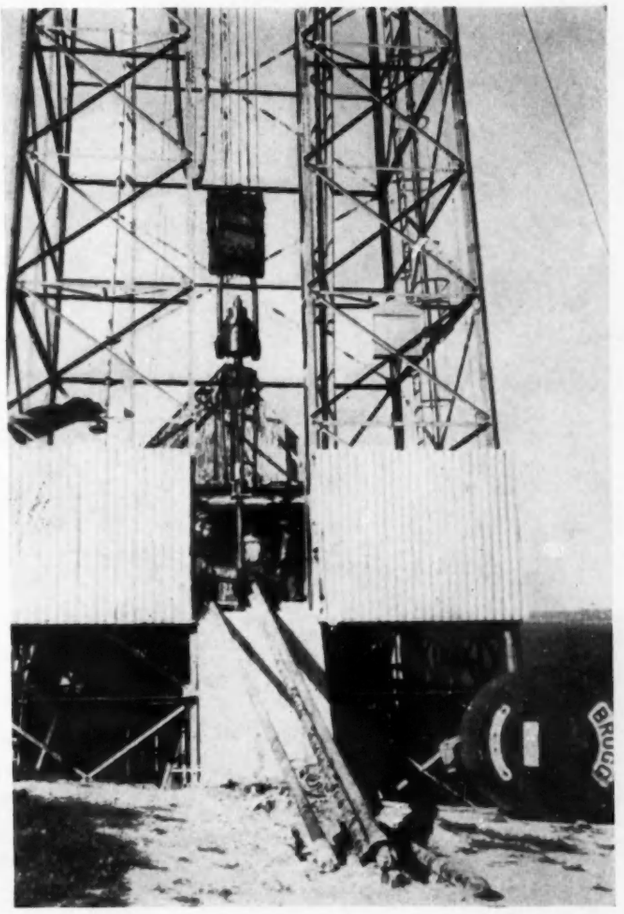
The Moll Wildcat

The Vingerhoets well at Moll in the Belgium Campine, well to the north of the collieries, was drilled for the purpose of ascertaining whether the presumably petroliferous belt could still be reached within Belgian territory. The Carboniferous coal measures were reached at 2831 feet. A 4100-foot section of coal measures was drilled, and the well abandoned at about 2000 meters (6500 feet) in the basal barren coal measures, presumably not far above the lower-Carboniferous limestones. The hole, however, was left in condition to be deepened eventually. No oil indications were encountered, with the exception of some gas. I do not consider this test quite decisive because the Carboniferous limestone was not drilled through. To do this would require that the hole be drilled down to around 2500 meters (8000 feet). The promises of so doing however are small. But it was worth while to explore this region, since we are here in practically unfolded rocks, sheltered by the buttress of the Brabant Massif. As said, however, though the country is not folded, it appears that we have drilled too close to the Variscan mountains. Our findings in the Peel region, which the writer drilled extensively for coal seams on behalf of the Netherlands Government in 1906-1917 with very good results confirms this conclusion.

Winterswijk Indications

Our next step, where coal measures could be reached within Netherlands territory, was far to the northeast in the region of Winterswijk. This was within the general area of the coal field of Westphalia, but about 60 kilometers northwest of the coal mining belt which extends from Essen to Dorsten (Ruhr-coal field).

In the Westphalian collieries practically no indications of petroleum have ever been encountered; they are too near to the folded mountains. Near Winterswijk, however, conditions change. Here remarkable indications of petroleum were found in coal measure sandstones in 4 wells drilled for coal, notably in a boring at Corle (1918), where 1167 feet below the top of the coal measures, at a depth of 3434 feet, 135 feet of saturated sands were found. Out of these so much oil collected on the mud ditch that it appears a small producing well could have been obtained if the hole had been planned as a test for petroleum. As it was, the flow was killed and the well carried down for its original purpose, to explore the coal deposits.



A search of the older literature showed that a considerable number of wells drilled from 1900 to 1907 for coal in Westphalia in areas well to the north of the coal mines, had shown very evident indications of petroleum gases and even oil. At that time nobody took oil possibilities in this region seriously, and the prospectors for coal were far from pleased to encounter some violent outbursts of inflammable gases and even petroleum in the coal measures. So the matter was not rumored around. A later search in old files of the government mining administration at Dortmund brought to light some remarkable reports by well known geologists of the Geological Survey, fully confirming these occurrences.

Deep Tests Planned

These facts and further geological research led to a series of borings by the Vingerhoets concern which started in 1933, after the writer had advised as to the possibilities explained above. These explorations still proceed. In several borings depths of nearly 6000 feet have been reached and in some cases very promising showings have been obtained in the Paleozoic rocks, even 900 feet below the surface of the Paleozoic below the Cretaceous, in Pennsylvanian strata. These showings regularly increased in importance with depth. In the writer's opinion the depth explored thus far is insufficient, and wells are planned to proceed until depths of around 9000 feet have been tested.

Circumstances prevent us for the present from giving further details about the work in this region and its prospects, with the exception of the statement that the corrrectness of the writer's theory has been completely corroborated by the results. Only extensive work can answer the question of whether oil and gas, the *presence* of which has now amply been proven, are present in accumulations of commercial importance. Only the drill can solve this problem. It is chiefly a question of porosity and the existence of proper reservoir rocks. The work will be very difficult, on account of the great thicknesses (4500 feet and more) of younger strata, which everywhere cover the Paleozoic and do not form a part of the structure of the older formations.

Current Work

In Netherlands territory, extensive and systematic co-operative gravimetrical work is in progress by several interested institutions. The geophysical indications are being followed up by geological test wells in order to explore the structural conditions at greater depths. The time is not yet ripe for the publication of any conclusions, though some of the geological tests have drilled to depths as great as 3000 feet.

The work in this continental region to the east of the North Sea, in conjunction with similar work in progress in Great Britain on the other side, with most of which the writer is in contact, is greatly increasing our knowledge of the deeper subsurface of northwestern Europe and may finally express itself in successes for these extremely difficult and costly explorations, which have only become possible through the present combination of greatly improved drilling technique and geophysical methods.

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ONE COMPACT UNIT ● The "Sealtite" Drilling Control consists of a "Sealtite" Weight Indicator, "Sealtite" Mud Pump Gauge, Torque Gauge and Tachometer, unitized into one compact unit ready for installation. The Weight Indicator has greater accuracy, sensitivity and capacity than any previous instrument and built-in illumination for 24-hour visibility. It reads directly in thousands of pounds or points on the large 16" dial face. (Dials are available graduated in the metric system, if desired.) Its 20% greater capacity is ample for 20,000 foot wells—far deeper than any thus far drilled.

THE "SEALTITE" MUD PUMP GAUGE is made in 3000- and 5000-pound capacities, with metric graduations on the dial, if specified. Installation is simply a matter of making one union connection to the mud line, as the system remains hooked up at all times. The high-pressure diaphragm unit is of government specification bronze, filled and sealed with the exact amount of fluid. The gauge case is sealed, and the mechanism runs in a bath of oil and is protected by special pulsation dampers. An M-D flexo-glass lens, shock and pressure proof, replaces shatter-proof gauge glass formerly used. The recording element is part of the triplex recorder on back of the steel case.

THE TORQUE GAUGE, connected to the engine manifold, gives accurate readings of torque in the drill pipe, and records the information on the paper chart of the recorder. The gauge is oil filled and protected by pulsation dampers that smooth out the readings. Here, also, an M-D flexo-glass lens replaces the ordinary glass previously used.

THE ROTARY TABLE TACHOMETER is fully adjustable for any ratio of table drive, and is furnished with permanent take-off for individually driven tables, or removable for drawworks-driven tables. Capacity is 300, 500, or 600 RPM, as desired. Easy, fast calibration is provided by an adjustment stem passing through the M-D flexo-glass lens.

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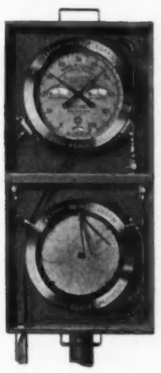

● Here's the control instrument that's known and used all over the world. It concentrates on one easy-to-read dial face important information such as weight on bit, load on derrick, pump pressure, table speed, and torque . . . and permanently records weight, pressure and torque on a single 12" paper chart. The Quintuplex is accurate, sensitive and dependable right down to the last foot you drill. *The Quintuplex has controlled the last 14 consecutive world's record-breaking deep wells*—an achievement that speaks for itself.

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● The Special Weight Indicator is instantly ready for any job on the lease. It has greater accuracy and sensitivity, and an oversize gauge mechanism with ample capacity for 20,000 foot wells. A special vernier gauge hand is incorporated for lightweight readings when milling, fishing, etc., and built-in illumination affords 24-hour visibility. Ten interchangeable dials are instantly ready for all conventional string-ups and line sizes, and if you want to read weight in points, there's also a "points" dial visible at all times.

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● The Unitized . . . the Slush Pump Gauge that is every bit as rugged, trouble-free and dependable as it looks. The gauge is oil-filled and sealed with Flexoglass lens—the diaphragm unit is filled and sealed with non-corrosive anti-freeze fluid. The instrument seldom requires attention of any kind, but if it should, it is an easy matter for a mechanic to make adjustments and repairs. This is important during operations far removed from service facilities and replacement parts. Furnished in 1000, 3000, and 5000 pound capacities or in corresponding pressures graduated in the metric system.

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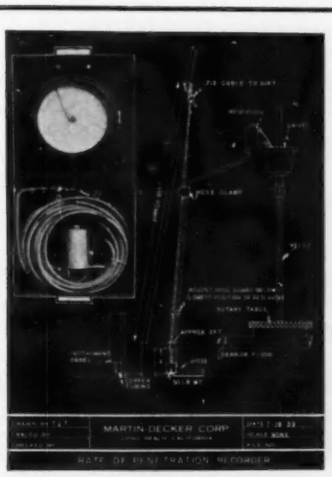

THE SLIM-HOLE WEIGHT INDICATOR

● The Martin-Decker Slim-Hole accurately indicates all loads up to 150,000 pounds with six lines, ample capacity to handle all types of shallow hole drilling or core testing operations. It's light, compact and portable, and as a new feature has the diaphragm unit built right in as an integral part of the all-bronze gauge case, further eliminating excess weight. A special pulsation damper smoothes out all readings even under the roughest conditions. Another feature is the newly-designed "C" clamp, requiring no shims for adjustment and operating in back of the case to allow full use of the dial circumference for the numerals.

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Bulgaria Will Continue Oil Search in 1940

Plans call for relatively deep tests to check geological and geophysical surveys; five areas considered potentially petroliferous.

SYSTEMATIC geophysical surveys and relatively deep drilling are planned by the Mining Section of the Bulgarian Ministry of Commerce for 1940, according to information received from Walworth Barbour of Sofia. These will be used to check and furnish details on previously made geological and geophysical surveys.

Bulgaria was subjected to examination by government petroleum geologists in 1935, an action which resulted in completion of several preliminary, or reconnaissance, surveys. In most instances these were not followed up by enough detailed work or core drilling to determine the structural characteristics of the regions involved.

However, from a geological point of view, there are five regions in Bulgaria which have aroused interest as being potentially petroliferous, or sufficiently promising to warrant exploratory drilling for additional geological information. These are:

1. The region of Kostenetz.
2. Kustendil region.
3. Northwest Bulgaria.
4. Northeast Bulgaria, including the districts of Provadia and Varna.
5. The eastern part of the Stara-Planina, or Balkan, mountain range.

Kostenetz is a region embracing the northern part of the mountain range of the western Rhodopes and includes the valleys of Kostenetz and Ribnitza. It is brought out in the Bulgarian Geological Association's Review, Year VIII, Book 2, 1936, that these valleys are filled with Tertiary beds and that bituminous schists and coal are known to be present. The region likewise is noted for its thermal baths, according to E. Kohen's "Geological Surveys in the Region Around Kostenetz in Connection with Petroleum Geology." Dr. S. Bontcheff and P. Bakaloff mention in "Geology of the Southern Part of the Region of Kostenetz-Bania in Connection with the Alleged Petroleum Deposits" (Yearbook No. 21, Sofia University, Faculty of Physics and Mathematics, 1925), that a covering bed of metamorphic schists upon the Tertiary bed show an impregnation with bitumen in the valley of Ribnitza. These last, incidentally, were the object of a more detailed survey on the part of the Mining Section. Negative results of this survey were responsible for cessation of exploration work, Barbour declares.

Kustendil Region

The region of Kustendil lies south and southeast of the town of that name. Presence of asphalt veins and bituminous schists in the Tertiary, which predominates throughout the region, was the occasion for surveys executed during 1935 and 1936, when Tertiary precipitates were known to consist of bituminous schists, asphalt veins and calcareous rocks and sands. Some of the Bulgarian geologists hold that "the petrographic structure of these materials, their strength, and to a less extent their structural forms, are favorable indications for the petroleum geology of" the places studied. It should be pointed out, though, that these opinions are based purely on surface geology, for the Kustendil region has not been drilled, nor has it been subjected to geophysical surveys.

It is likely that Northwest Bulgaria will be one of the first regions tested with deep drilling and geophysical surveys in 1940 if plans of the government are carried out. This is because the region represents an immediate prolongation of the productive Rumanian petroleum basin, now being called upon for more oil than it can yield. Observation of this geological feature justified government sanction of the surveys made in 1936 and 1937. Those surveys, according to statements appearing in R. Beregoff's "The Tertiary in Northwest Bulgaria," Bulgarian Geological Association's Review, Year IX, Book 3, 1937, established that the region is occupied by a thick Tertiary basin (Eocene, Miocene and Pliocene) in which two bituminous horizontal layers have been discovered in Eocene and Pliocene beds.

Northeast Bulgaria

Provadia district in northeast Bulgaria is interesting to petroleum exploration men because of the presence of salt and characteristic structural forms, such as short anticlines among rather horizontal strata, sunken ridges and what are locally described as diapired undulations. A number of shallow tests, the deepest of which went to 400 meters, have been made for the purpose of determining the structure of the salt deposits. As to age, these deposits were laid down before Cretaceous time and are probably Triassic or Permian, if one follows the reasoning of Dr. V. Tsankoff in "Geological Surveys of the Neighborhood of the Salt Deposits at Mirovo, District of Provadia," a paper published in the Bulgarian Geological Association's magazine, Year IX, Book 2, 1937.

In addition to the work of Dr. Tsankoff, other geological studies of Provadia region, all conducted with a view to finding petroleum, are touched upon in a paper published by Dr. Kohen a year after the paper by him previously referred to. His later paper, found in

(Left)—On the docks at New Orleans Columbian Bolted Tanks wait to be slung into the ship's hold.

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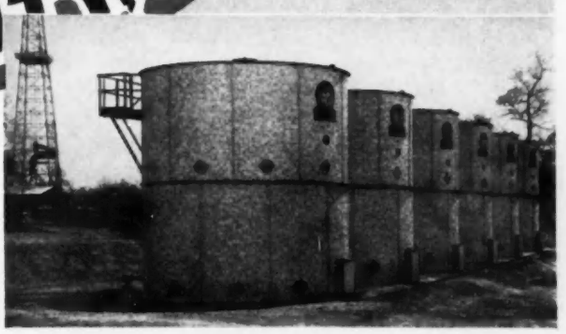

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Showing location of five regions in Bulgaria which probably will be subjected to exploratory drilling during 1940, barring military interference.

the association's Book 3 of Year IX, was titled "Geological Surveys of the Salt Regions in the Provadia District." In the Review of the Association of Bulgarian Engineers and Architects, 1937, there is a study of the region by C. Constantinoff called "The Salt Deposits in the Provadia District." Further contributing to the geologic knowledge of the region was a separate book by B. Radoslavoff on "The Rock Salt Deposits in the Provadia District"; it was published in 1928.

Independent of the aforementioned geologic surveys, a number of wildcats, ranging from 180 to 510 meters in depth, were drilled following a series of geophysical surveys. These exploratory tests confirmed the general structure of the region as indicated by geophysics and warrant, in the opinion of the Bulgarian Mines Department, drilling additional deeper tests.

Several other anticlines have been observed in Provadia district, but none has been checked with drilling. As a matter of fact, professional opinion in Sofia seems to be that the whole region is unscratched so far as serious exploratory effort with the drill is concerned.

Varna Region

A second promising region of northeast Bulgaria is the Varna district, an area containing gas seepages. Some hold the source of the gas probably the Oligocene of the Varna Tertiary basin. At any rate, it has been the cause of considerable geological and geophysical work and at least three exploratory bore holes, the deepest of which was drilled to 258 meters. Commercial results of the tests were not worth mentioning except to disclose that the gas had characteristics similar to that found in the Maikop petroleum series in Russia, across the Black Sea from the city of Varna, a port. Attempts are being made to establish geological similarities between the two areas. In this connection it is interesting that Dr. P. Gotcheff expresses the belief that the region around Varna represents the northern and gentler side of a large anticline. This is found in his "Geological Notes on the Region of the Varna Lakes," Review of the Bulgarian Geological Association, Year VI, Book 1, 1934.

The eastern part of the Stara-Planina, or Balkan, mountain range represents an "interesting analogy by the curve of its main ridge to that of the Carpathians, where petroleum deposits are found in Tertiary layers," says Barbour. It might be added that another characteristic of this region is the presence of numerous hydrosulphuric springs and gas seepages with traces of iodium and higher hydrocarbonates. These were the conditions that led the Mining Section to the conclusion that a geological survey with the object of establishing the existence of petroleum would be worthwhile. Added to the inducements was the fact that the fore-ridges of the main mountain range are built up by Tertiary.

The geological survey of eastern Stara-Planina, now being carried out, is being aided by shallow core holes. From a standpoint of oil possibilities, the region is considered one of the most promising in Bulgaria.

Turkey Continues Testing Despite Disappointments

ALTHOUGH the search for oil in Turkey, carried on under auspices of Maden Tetkik ve Arama Enstitusu, has gone forward diligently since 1934 without establishing commercial production, findings lend encouragement to future efforts, and the search continues unabated.

Cevat E. Tasman,[1] director of Petrol A. Grubu, advises current exploratory efforts, so far as drilling is concerned, involve three localities: Raman Dag, Gercus and the Hocali dome near Adana. While most of the work has been done south of the Tigris river, certain spots north of the Tigris, notably Raman Dag, are receiving attention.

Turkey is going about government prospecting work in a consistent, scientific manner, fully realizing that considerable time and money are required in establishing independence from petroleum imports in a nation that has never produced oil. The government has set up the necessary organizations for paleontology, geology and drilling. Early in 1939 the Mining Research and Geological Survey worked out a five-year program of prospecting, so that, barring exigencies of war, continuation of the search may be expected for a few years.

How much money Turkey has spent in exploratory effort during 1939 is not known, although it is common knowledge that the wildcatting continued actively. Up to the beginning of the year, however, the government had spent 1,500,000 Turkish pounds on the search and apparently was in the mood to carry on, according to John Embry of Istanbul. The man in charge of Turkish wildcatting, himself a geologist, has been quoted as saying: "After all the preparatory work [geology, et cetera] is done, the existence of oil still is determined only by drilling." Governmental Turkey appears to share this sentiment.

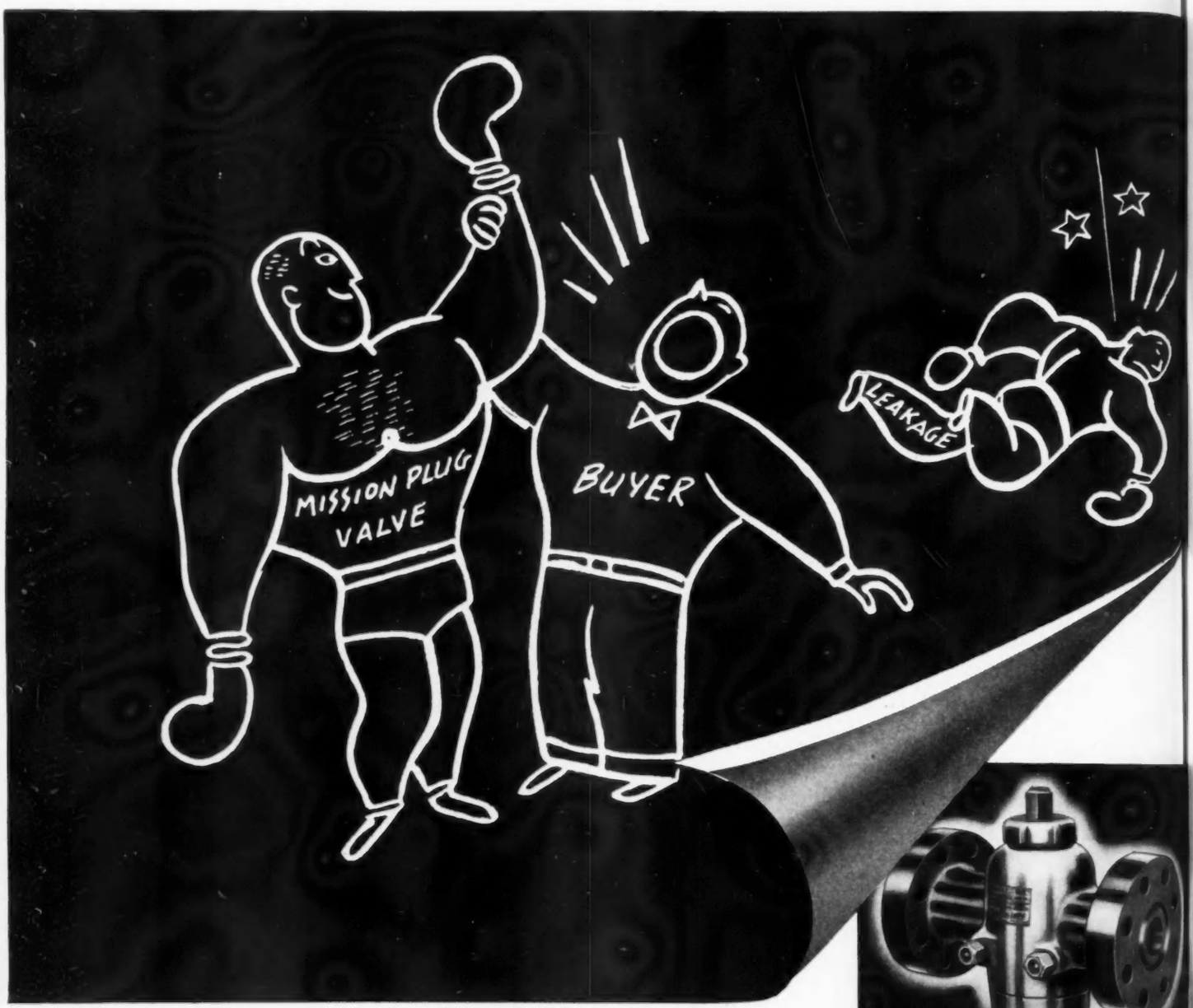
In a previous explanation as to why Turkey had not yet developed commercial production, Tasman pointed out that the seventh well drilled in Iraq was the first to produce and that Morocco's search continued 15 years before production was established.

Search for oil in Turkey has been actively prosecuted since 1934 when a well on Basbirin structure, 70 kilometers north of Mardin, was drilled with cable tools to 4351 feet and abandoned because of

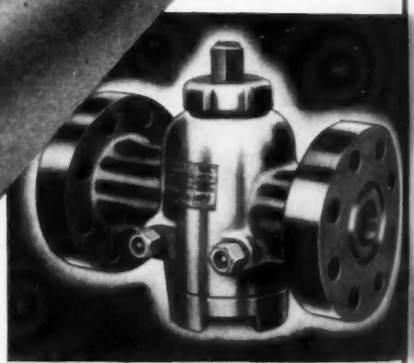
Something of the nature of the terrain in eastern Turkey is afforded by this shot of the cable tool rig used at Kerbent.

Cevat Eyup Tasman, director of petroleum operations in Turkey who was active as a petroleum geologist and engineer in the United States for several years.

[1] Tasman, a petroleum engineer and geologist formerly known in the United States as Djevad Eyoub, changed his name in compliance with a Turkish decree stipulating that all residents of the country adopt Turkish family names.



The New Mission Plug Valve



Test Pressures: 4,000 to 10,000 lbs. Tested drilling rigs, flow lines and Christmas trees for 24 months without a failure.

because of automatic full-port lubrication, is always easy to operate gives a perfect seal, and reduces friction, wear and maintenance cost

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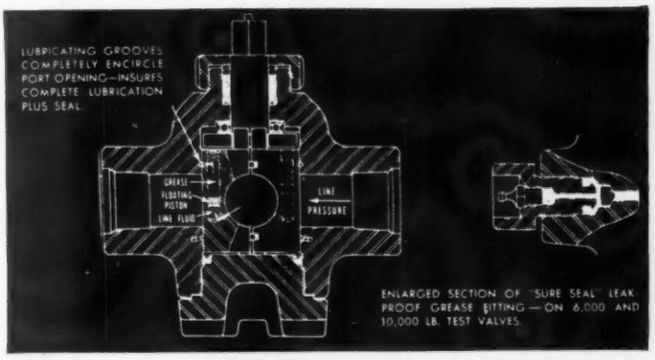
Automatic Lubrication. Patents give Mission the exclusive use of line pressure to force the lubricating grease from its storage reservoir into grooves on the bearing surfaces. These grooves completely encircle the port opening — so, as long as you make sure there is grease in the reservoir, complete lubrication and a positive seal are assured. Don't take chances — refill the reservoir regularly. You will add indefinitely to the life of the valve. A temporary failure to watch the grease supply will naturally not be as serious as the danger inherent in the old-style method of lubricating plug valves, which require constant attention and manual operation to maintain the necessary pressure seal.

The Straight Core Prevents Wedging. The Mission valve always opens and closes more easily than the old-fashioned tapered core valve because its cylindrical core positively cannot wedge. Since a cylindrical core has only rotary motion, it always fits its seat perfectly. This enables Mission to constantly maintain a perfect seal which reduces wear and leakage.

The Super-Surfaced Split Core. By splitting the core vertically in half and spreading the halves by springs a perfect fit is obtained. Under line pressure the upstream half "floats"—all the pressure and the only friction are on the downstream side of the valve. This is another reason why the Mission valve opens easily—and in addition friction and wear are further reduced, as the core is file-hard, corrosive-proof, super-surfaced. This "super-surfacing" is an expensive treatment which gives the core a smooth, glazed surface.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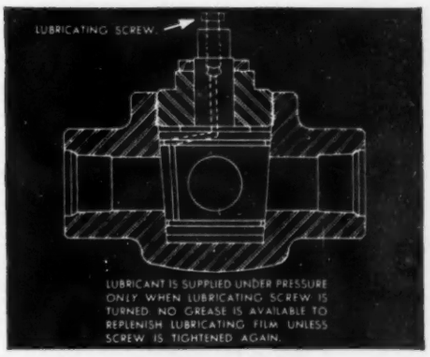
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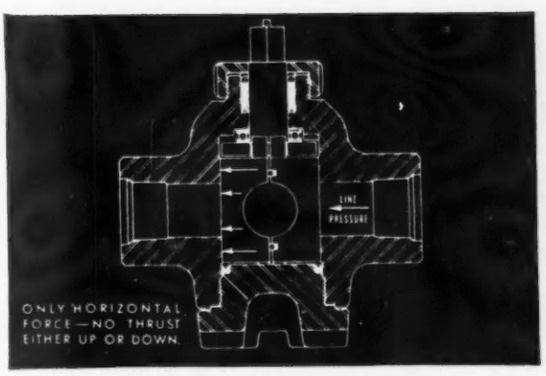
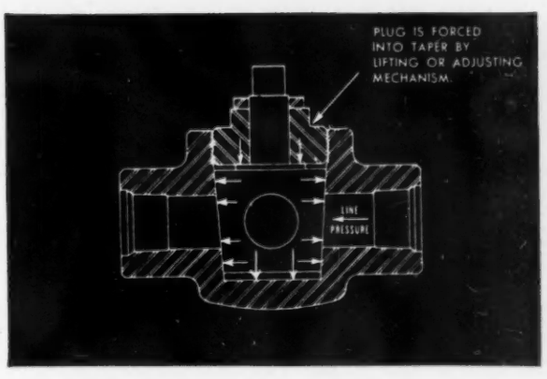


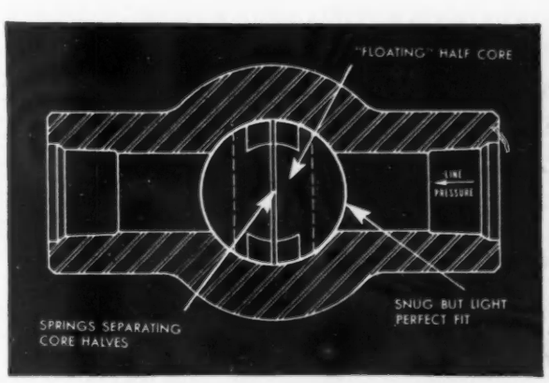
MISSION STRAIGHT CORE

A cylindrical plug seats perfectly and permits minimum side wall clearance. Constant lubricating seal is easily maintained. This increases valve life — assures easy operation.



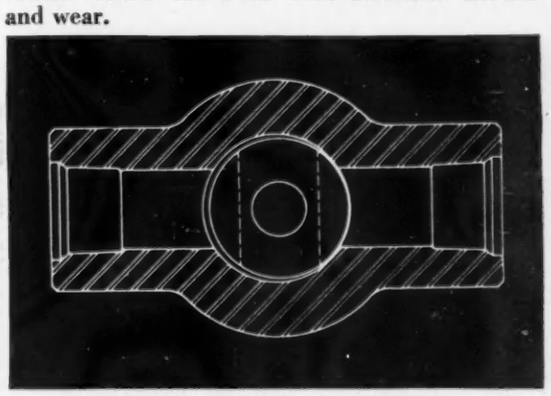
CONVENTIONAL TAPERED PLUG

A tapered plug also has vertical motion. It can seat perfectly only when wedged. Greater side wall clearance in operation makes a perfect seal difficult and allows opportunity for sand to accumulate under the seat. This increases friction and wear.



MISSION SPLIT CORE

Perfect contact with body allows instant seal under pressure. This protects surfaces from sand and grit, reduces cutting and wear, and reduces maintenance costs.



CONVENTIONAL SOLID PLUG

Unless wedged, a solid plug cannot fit its seat perfectly. As the plug wears, it cannot fit. This permits accumulation of sand and grit, accelerating wear, and greatly increases difficulty of operation.

ission Plug Valves are made with the same careful tandards of metallurgical research, manufacturing pre- sion and inspection that have made each Mission prod- ct a leader in its field. This valve again emphasizes our ng-established policy, "If a product designed by Mission not proven superior, Mission will not produce it." Mission Plug Valves are manufactured in 2″, 3″ and 4″ zes and in three grades—4,000, 6,000 and 10,000 lb. test pressures—and are available or can be ordered from leading oil well supply warehouses. Prices of each style and size compare favorably with those of the best plug valves formerly available. Full details are available on pages 1716 to 1724 of The Oil Weekly Composite Catalog of 1940.

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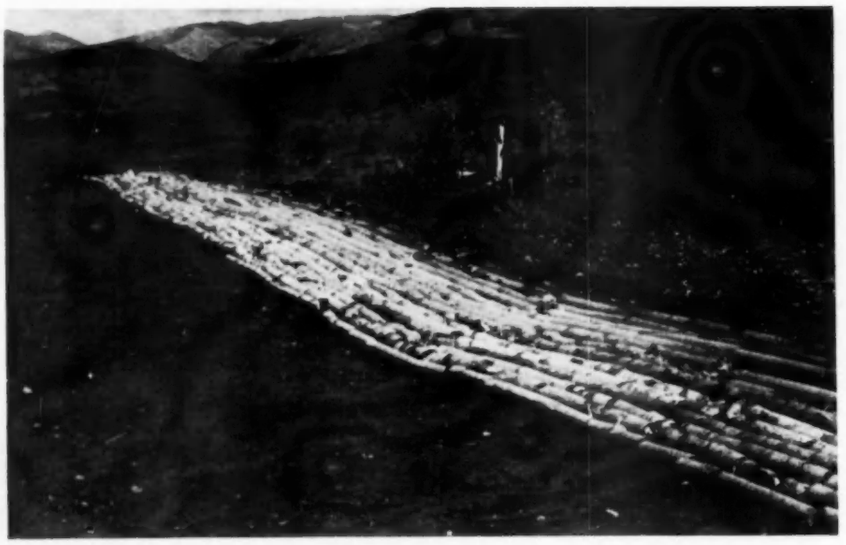


Methodical and consistent are two words that have been used to describe the current search for oil in Turkey. This picture tells the story of thoroughness in coring done at Hermis 2, one of the exploratory tests referred to in the text.

striking a subterranean water course.

Operations were shifted to the region of Midyat, south of the Tigris and in eastern Turkey. A well at Hermis went to 3088 feet and encountered many shows of oil, gas and asphalt, with enough gas to fire the boiler for an offset that went to 2066 feet without significant gas showings but with better oil showings than those encountered in the first test. Neither was capable of commercial production. A third well in the region, located at Kerbent, drilled to 3380 feet and was abandoned because of salt water and hot sulphur water. The rig used for these three tests has been moved across to the northern side of the Tigris and is drilling somewhere below 2000 feet at Raman Dag.

Developments late in 1939 were sufficiently encouraging to warrant purchase of a rotary rig capable of going to 10,000 feet. This is drilling on top of a dome in the plains of Cukurova, southern Turkey, while another rig is being used for taking regional stratigraphic cores in another likely area.

Three types of rigs are used in Turkish operations—rotary, cable and coring. The cable tool rig is manned by Americans under supervision of S. H. Russell, of Dallas, Texas. The rotary drillers include a German, a Dutchman and a Rumanian, while the coring rig is run by a Frenchman and Turks.

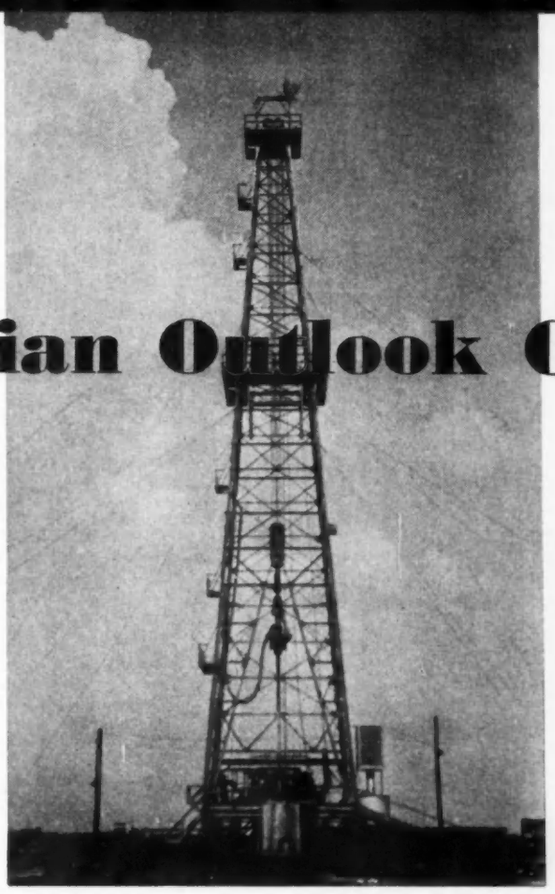
Up to the beginning of 1939, Turkey had put down 17 wildcats that had slight showings of oil, but not enough for commercial production. All were relatively shallow and a few indicated strengthening of the theory that production, if any, would be found only at greater depths.

Maden Tetkik ve Arama's early efforts centered around Murefte in the summer of 1935, when four shallow wells, varying in depth from 55 to 135 meters, were drilled in the vicinity of Hoskoy on Marmora Sea. This was in a neighborhood where an old Turkish well had indicated proximity of a crude reservoir of some kind.

The rise from the sea to the top of the Eocene limestone is fairly abrupt at Murefte, which is 81 miles from Istanbul and on the European shore of the sea. Mount Elie, an overthrust block capped with this limestone, is 680 meters high though only five kilometers from the shore. Structural conditions in front of the overthrust mass are obscured by numerous landslide deposits. However, some minor folds can be observed. It is considered possible that small traps for oil may exist at points where these minor folds are intersected with cross faulting. Miocene sediments overlying the area are sands, marls and shales, some of which show oil at Isterne Dere and at a branch flowing into Hora Dere. Two wells drilled near Hora Dere had showings of oil, but too much salt water at the same time. A third, drilled near Murefte itself, had relatively heavy gas showings, 1,800,000 cubic feet being the highest gauging, but later was abandoned because of water.

Fording a Turkish Creek. The man carrying the suit case is S. H. Russell of Dallas, Texas, drilling superintendent of cable tool rigs being used in Turkey's current wildcatting campaign.

Rumanian Outlook Clouded



Country's largest revenue producing industry crippled by exchange situation which prevents normal maintenance and replacements

RUMANIAN production for 1939 was 45,640,100 barrels, a drop of 6.8 percent, and continuation of the downward trend initiated several years ago, a trend which reflects difficulties of operation under the old petroleum regulations and those governing money exchange.

Output for the previous three years has been as follows: 1936—64,462,236 barrels; 1937—54,142,600 barrels; 1938—48,984,200 barrels.

The only fields showing increased output during the year were Baicoi-Tintea and Ceptura, with gains of 43 percent and 5 percent, respectively. Declines of the six major fields averaged 23 percent.

During 1939 total footage drilled in Rumania was 855,000 feet, a decline of 106,000 feet or 11 percent from the amount drilled in 1938. The 1939 footage total resulted from drilling 150 wells, most of which were drilled in Baicoi-Tintea, Ceptura, Ochiuri, and Margeneni.

Explanation of the decline is that those financially equipped to engage in exploratory work which might have a tendency to stem the decline have not been able to obtain blocks of land large enough to make it worthwhile to indulge in a costly search.

Less Footage Drilled

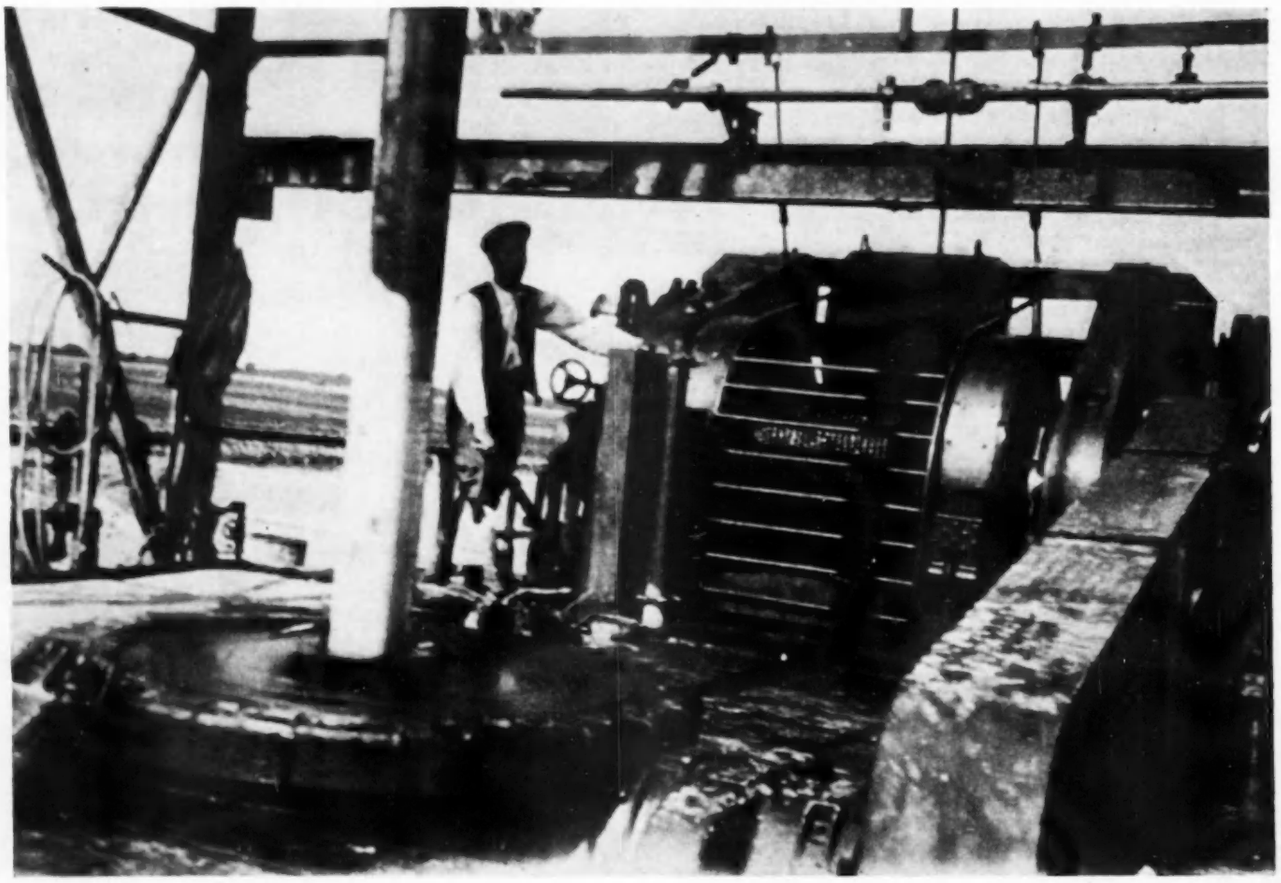
Drilling as a whole has shown a tendency to decline also, for preliminary figures reveal an average of about 69,064 feet per month for the first 10 months of the year, as compared with an average of 77,080 feet per month established in 1938. As October's footage had dropped to 61,277 feet, which is considerably below the above indicated monthly average for 1939, it was anticipated by those familiar with the situation that the year's total footage would be at least 16 percent under what it was in 1938, war or no war.

WHILE the article on this page deals primarily with production, drilling, and currency and legal difficulties, the reader is referred to another article on Rumania in this issue dealing with the question of the probability of that nation's being drawn into the European war because of her oil resources.

As to the outlook for 1940 in this respect, the situation is muddied to such an extent that anything might happen. It is known that German technicians have gone into Rumania in an effort to obtain concessions and develop production. Whether the policy of the government will be such as to encourage their enterprise is a mooted question. Success of a newcomer among established wildcatters in a given region is accelerated or retarded by the degree in which "dope" is available from those relatively familiar with the ground. British and French interests control most of the surface data. If the Germans are allowed to follow through on their plans, any speeding up in the matter of finding new reserves will have to be generated within the German organizations themselves.

Good Price Incentive

The price incentive for increased drilling certainly exists in Rumania, for competing war interests have raised the local postings to the sky, so much so, in fact, that Rumania has lost some export customers for the reason that they



Heavy-duty rotary used by one company for drilling 9000-foot wells in Rumania.

cannot afford to pay what others are bidding. Offsetting the price incentive is the impending danger of invasion, consequences of which can bode no good for Rumania, as outlined in a most interesting article in this issue by Dr. Ionel Gardescu.

Drilling during 1939 did slightly extend some of the older fields: notably Tintea, Baicoi and Ceptura, but the additional production from completions in the added areas was not sufficient to offset the general decline throughout the country. No new fields were found during the year.

Only seven wildcats were completed during 1939 in Rumania and 1940 opened with only six exploratory tests drilling. Two of the wildcat completions were drilled on obligations imposed by the state, and all but one were based on surface geology.

The latest major strike in Rumania was in 1934, when Bucsani was discovered. The latest deep sand strike of importance was that of the Meotic pay in Baicoi-Tintea in 1937.

Word from Rumania February 27 stated: "From a technical standpoint steady progress is being made in the drilling, production and refining branches. The destructive competitive feature has been lessened to a marked degree through company cooperation and state regulations which protect in a fair manner the individual leaseholders."

A crippling influence on the normal growth and expansion of the oil industry in Rumania has evolved from the many currency and trade restrictions. Engineer I. E. Bujoiu, a former minister of the national economy, has taken the lead in a struggle to break the strangle hold that these restrictions have had on the commerce of the country. His best effort was the introduction of a new currency law, dated October 1, 1939, which was designed to release to commercial concerns in Rumania a larger quota of strong currencies; i.e., British pounds, United States dollars, Swiss francs, and the like.

Lack Strong Currency

One of the main difficulties which has handicapped the oil companies in doing business in Rumania has always been the lack of strong currencies, although the country has many good markets for oil, cereals, timber, etc., which have brought in considerable, but not enough, of such currencies. A fair proportion of Rumania's trade has been with neighboring or other European countries that also have weak or blocked currencies. Greece, Germany, Bulgaria, Hungary, Turkey, Italy and Yugoslavia are examples of the weak or blocked currency nations.

Trade with these countries, for oil or other commodities, is carried on under clearing arrangements whereby the Rumanian exporter to any of these countries receives, after considerable delay, Rumanian lei in payment, while the balance of trade between Rumania and the importing weak currency country is taken care of by funds held by the national banks of the respective countries. No currency transactions pass between these countries, as the weak currencies are blocked and the funds held in credit of Rumania can be liquidated only by the importation into Rumania of materials from the debtor country.

Official rates of exchange in Ru-

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mania are quite arbitrary and are maintained by means of currency laws primarily to force exporters to free currency countries, like the United States, England and Switzerland, to give up most or all of their free currency resulting from such exports at the official lei rate of exchange, which always is far from the actual unofficial, or free market rates which show the true value. For example, the official rate may be 140 lei for $1.00 U.S., while on the open market one may be able to get as many as 540 for his dollar.

Some Improvement

Much has been done during the past two years to direct Rumanian exports to free currency markets, but the results are far from satisfactory to the large exporters, such as the oil companies, who receive very small percentages of free currencies as the result of most of their exports.

Aside from the clearing arrangements between Rumania and the weak currency countries, clearing agreements were made with England, Belgium, France and other strong currency countries whereby oil exporters in Rumania received a definite percentage of free currencies which could be used only for clearly defined purposes. These percentages, however, have not allowed the Rumanian oil companies to fulfill dividend requirements, process licenses and other non-material obligations, to say nothing of their requirements for oil field materials.

And speaking of requirements for oil field materials, the Rumanian situation has brought to light a rather interesting condition with respect to the capacity of certain nations for turning our equipment that will stand the gaff of oil field usage.

U. S. Equipment in Demand

Although many European countries, including Germany, have tried to manufacture oil field equipment, maintenance and replacement records show that the results generally have been poor with the exception of certain easily manufactured items. Rumanian manufacturers have insisted that they can furnish many of the oil field equipment items and thus have obtained protection by embargoes on such items previously imported from abroad.

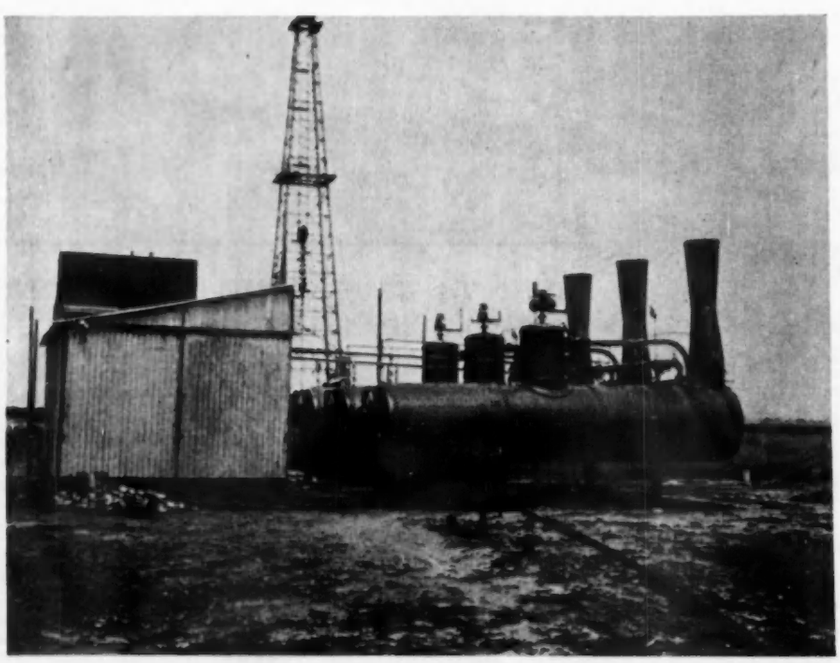
The fact remains that the larger operating companies, regardless of which nation is represented in the controlling interest thereof, find that they cannot get along without American oil field equipment, and for years their main complaint to the Rumanian authorities, aside from demands for new exploration areas on reasonable terms, has been the lack of dollars with which to buy drilling, producing and refining equipment.

Referring back to the law proposed by Bujoiu in October, which was designed to remedy, among other things, the difficulty in obtaining American equipment, that legislation was bitterly opposed by the National Bank of Rumania which had a very strong control on all free currencies resulting from petroleum and other exports. The National Bank, therefore, did everything legally possible to kill the new law, and one result of the recent reshuffling of the Rumanian cabinet was the easing out of Bujoiu. So, despite the fact that the law of October 1, 1939, was a help to the situation, the oil companies are still unable to purchase all the equipment they need from the United States.

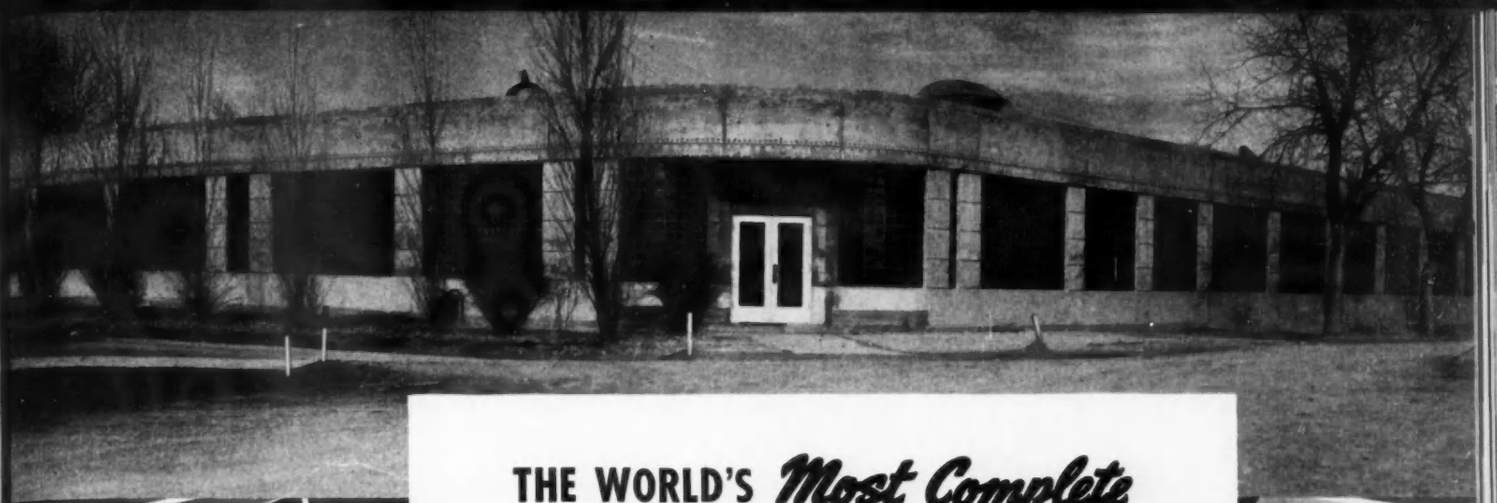
Many orders have been open for months, due to lack of exchange, and although large oil purchases by England at the high prices now prevailing are bringing to the Rumanian oil companies a fair amount of free pounds sterling, the majority of these pounds, under the Anglo-Rumanian trade agreement, can be used only for material purchased through English branches of American concerns. Such purchases are rendered difficult due to the inability of the English branches to remit dollars to their American principals under the prevailing English war-time restrictions on currency.

Nevertheless, it should be pointed out that the vital question of free currency for American oil field equipment is gradually, if very slowly, becoming ameliorated. And if Rumania escapes from Russian invasion this spring, there should be a very considerable upswing in business for the American manufacturer.

Especially urgent in Rumania is the need for modern drilling equipment. Depths continue to become greater there as they do in other countries. Eleven of the 1939 completions went to 9870 feet or better, whereas the deepest well drilled in 1939, Concordia Company's Tzintea 201, went to 10,981 feet. The deepest producer completed in 1938 was bottomed at 10,165 feet, only to be exceeded in depth the following year by Unirea Company's Tzintea 429, which produced from 10,560 feet.



Rumanian field boiler battery supplying 300 pounds pressure, super-heated steam, and water filtration plant.



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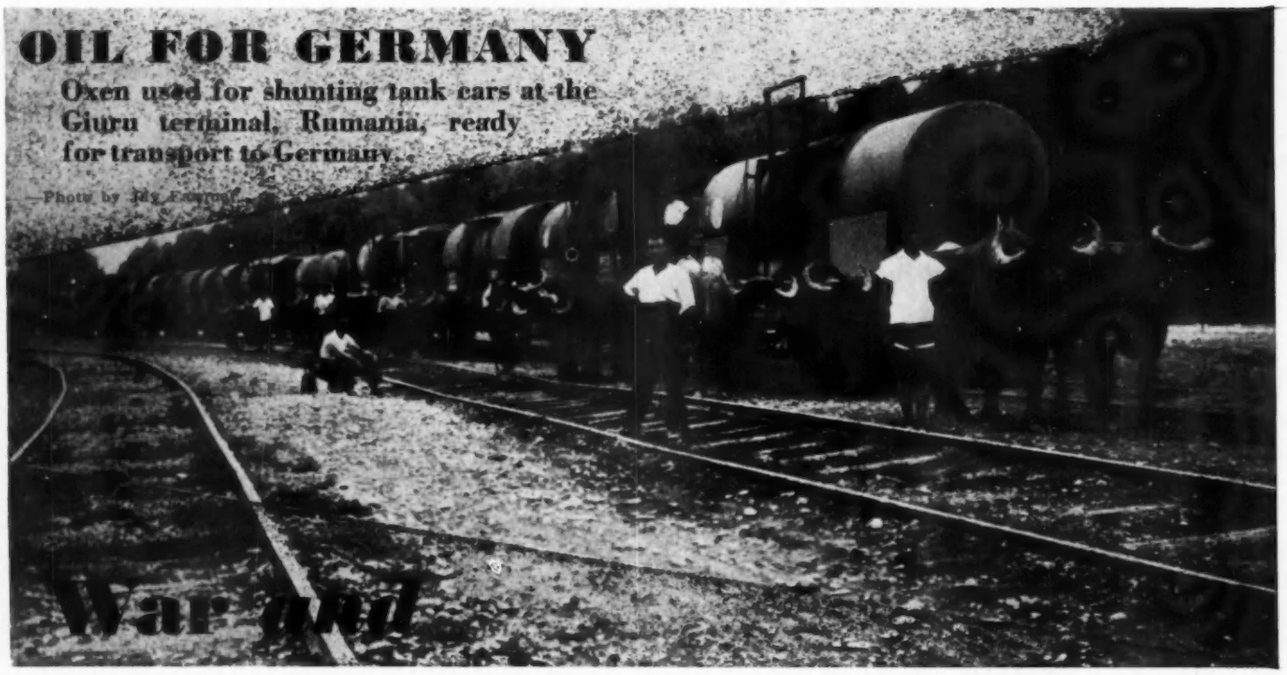

Rumanian Oil?

By DR. IONEL I. GARDESCU
Consulting Petroleum Engineer and Geologist, Houston, Texas

TWO years before Colonel Drake drilled his famous Pennsylvanian well, in 1859, Rumania shipped two cargoes of oil to the United States. Official statistics list Rumania as the first commercial producing country in the world, and since 1857 oil has played an important part in the economic development of that country. With the exception of the U.S.S.R., Rumania is the largest oil producer in Europe. During this last decade the oil production of Rumania approximated that of Kansas.

Total oil production of Rumania since 1857 amounts to only two thirds of the present annual production of the United States. Nevertheless, Rumanian oil has played an important part in international politics and in the present war may cause a change in the history of Europe.

In the fall of 1916 Rumania entered the European war on the Allies' side. Its oil production prior to that time averaged 35,000 barrels per day. It was not much, but it meant a great deal to Germany's warfare. When the powerful German and Austrian armies, under the command of Marshals Mackensen and Falkenheim, forced the Rumanian troops to retreat, Rumania set fire to its refineries, plugged its wells, and flooded its oil fields. The Germans restored some of the wells and intensified drilling activities and by 1917 built up the oil production to an average of 10,000 barrels per day. That same year the German Reich Bank entered into an agreement with the Hungarian government for the intense oil exploration of the 44 salt domes located in the Transylvanian basin, which up to that time had only yielded dry natural gas.

Then came peace. The Germans did not get to explore the Transylvanian basin, nor have the limited recent explorations revealed the presence of any oil. The treaty of Locarno, which was to decide on some economical issues not covered by the treaty of Versailles, disposed of all German interests and ownerships in the Rumanian oil industry. Their holdings were equally divided in three among Britain, France and Rumania. Thus one of the major operating companies, Steaua Romana, changed its ownership after the war. The Rumanian government also took ownership of the 44 Transylvanian salt domes after buying out the interest of the Hungarian U. E. G. Company.

Then came the Italian-Abyssinian war and with it the oil embargo imposed by the League of Nations against the aggressor. Italy strongly protested the embargo and declared herself ready to take arms against any country trying to apply any sanctions. The Italian warning was a direct hint to Rumania. The diplomats in Geneva figured the situation cautiously and decided that since Italy owned an oil company in Rumania, the Prahova, which company owned and produced some oil, it would have been unlawful to take away its oil. The embargo was thereby called off. The outcome of the Abyssinian war may have been very different if the oil embargo against Italy had been carried out.

Rumanian Oil Fields

Most of the Rumanian oil is produced from piercement type salt domes that occur in a small area located between Bucharest, the capital of Rumania, and Sinai, the famous summer residence of King Carol II. The salt domes occur along an elongated anticlinal structure that parallels the trend of the

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Carpathian Mountains. In 1926 oil was discovered in two deep-seated salt domes. However, before any geophysical prospecting could reveal the existence of other deep-seated structures the Rumanian government passed a law in 1927 by which it claimed ownership to all underground minerals, including oil and gas, that had not been proven or anticipated by a specific lease agreement at the time the law was passed.

With the rapid exhaustion of the piercement type structures the need of new prospecting and the proving of new structures became acute. Some prospecting was done and one deep-seated dome, the Bucsani field, was located, but the restrictions set by the government greatly retarded the adequate development of oil reserves. Recently the government modified its mining law encouraging oil exploration. Large prospecting units were retained and considerable geophysical prospecting was done during 1939 all along the Carpathian foothills and particularly in Bucovina, the most northern portion of Rumania, which in recent news attracted attention because of reported German and Russian troops concentrations along its borders. These prospectings, however, have not revealed any additional reserves and the present oil supply of Rumania is limited and shows no possibilities of increase in the near future.

Pipe Line Outlets

The Rumanian oil fields have two pipe line outlets, one to Constanza on the Black Sea and one to the Danube 30 miles south of Bucharest. The Black Sea outlet is closed to both Rumanian and Russian oil because France and England control the Mediterranean and their fleet would confiscate any oil passing through the Bosporus. Furthermore, it should be remembered that Turkey recently closed an agreement with France and England. The Danube River provides the cheapest and most direct transportation route to Germany. The upper part of the Danube is usually frozen during the winter months and the oil would have to be shipped at least part of the way by rail.

The present crisis does not involve either the transportation of oil or the ability of Rumania to produce oil, but centers around the controlling French and British ownership of the oil developing and marketing companies.

Largest among the Rumanian oil companies is Astra-Romana, a direct subsidiary of Shell and therefore primarily English controlled. Steaua Romana, originally a German-controlled company, now is equally divided among the British, French and Rumanian interests. The Rumanian interests are held by a group of banks which assumed an important loan payable to the British and French interests in Swiss francs, which ties up to some extent the Rumanian interest.

Concordia is controlled by a group of Belgian and French banks. This company has attempted to overcome the difficulties of securing drilling equipment from abroad by building some of its own equipment plants and, in addition, has invested a substantial share of its profits in gold mining explorations in Transylvania.

Romano-Americana is a direct subsidiary of Standard Oil Company of New Jersey. Creditul Minier is partially controlled by Rumanian capital. The company's modern refinery at Brazi was built by Czechoslovakia on the basis of a prolonged oil payment. When Germany occupied Czechoslovakia she demanded the immediate oil payment of the company's indebtedness. This payment greatly exceeded the producing capacity of Creditul Minier and is responsible in part for the present crisis.

Unirea and Oilfields Development are subsidiaries of the British-controlled Phoenix Oil & Transport Company. Colombia is entirely controlled by French capital.

There are many other small companies operating in Rumania but their production is of little consequence. The above listing of interests very clearly shows why the Rumanian government cannot grant Germany its ever-increasing demand for oil without confiscating oil that belongs lawfully to France and Great Britain. Furthermore, the Rumanian government sold to the French government all of its oil royalties in 1936 in exchange for ammunition.

Political Events

In September, 1939, after the collapse of Poland, both German and Russian troops raced toward the frontier of Bucovina, the northernmost province of Rumania. Polish troops and large numbers of refugees crossed the border with the Russian troops in close pursuit. As it stands now, Germany does not border Rumania at any point and any invasion of German troops into Rumania has to take place through Hungary or Russia. On September 21 the Rumanian Prime Minister Calinescu was assassinated by members of the Iron Guard, a Nazi organization. Drastic measures were taken by the government under the leadership of the new Prime Minister, General Argesianu, and order was quickly restored. A month later Germany demanded from the Rumanian government the immediate delivery of substantial quantities of oil. Such a request had been anticipated. E. L. Estabrook, who is in charge of Standard Oil Company of New Jersey's producing department in Europe with headquarters at The Hague, left for Rumania during the latter part of September to join there other officials representing the foreign oil interests. The German demands, amounting to a confiscation of oil belonging to France, Britain, and the United States, caused a governmental crisis. George Tatarescu, former prime minister, was called by King Carol II to head the government. Tatarescu had previously been minister of Rumania to France and had the confidence of the Allied governments. Some increase in the rate of oil shipments was granted to Germany and the crisis was thus momentarily averted.

Faces New Crisis

Now comes a new demand from Germany for higher shipments of oil. France and Britain are protesting and threaten to withdraw their economic and military support in case of an aggression. If her requests are not granted, Germany is most likely to invade Rumania. Just what the French and British assurances are worth is debatable —particularly in view of the experience of Poland and Czechoslovakia. Similarly, during the first World War, France and England did not venture to send their troops that had landed nearby in northern Greece at Saloniki and in the Turkish peninsula of Gallipoli to the rescue of their Rumanian ally.

It is not a question of Rumania's doubting the outcome of the war or the fairness with which the Allies will carry out their moral obligations. It is the realization of the devastating consequences of a war likely to be fought single-handed against a powerful and well-armed aggressor for the possession of its oil.

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Pictorial Story of Geophysical Prospecting in INDIA

WITH the search for crude oil in nations other than the United States gaining in intensity, foreign geophysical operations likewise have expanded materially. For more than 15 years, geophysical explorations have been used extensively in the potential producing countries of the world, but now their activities have been expanded to all corners of the globe.

American concerns are sharing the greater portion of this geophysical business, sending crews and equipment from this country. Their findings may have a tremendous bearing on the future economic status of the world from a petroleum point of view. Already, nations outside of the United States have reached a point of producing about 40 percent of the world's output of crude, many of the discoveries being directly accredited to geophysical exploration.

The work, however, possesses a quantity of hazard and danger to the crews that put them in the category of trail blazers. Some of the stories told by geophysicists of their foreign experiences sound fantastic.

The first major foreign geophysical development was in South America. This was started during the earlier days of equipment development and its cumbersome makeup further added to difficulty in traversing the wild country. With the aid of natives and guides, much of that vast wilderness was mapped. As work expanded into the rest of the world—Europe, Asia, Africa—new experiences confronted the explorers.

The prime hazard has been in transportation. In much of the area to be explored, roads are not available. Even where roads have been built, they are frequently impassable due to the intense rains. As will be noted from the accompanying pictures, the so-called roads are nothing more than mud bogs. Through the jungles, natives are required to pack the equipment for exploratory work upon their backs.

The transportation situation has affected equipment designs materially, and much of it has been constructed to afford compactness. Units for sinking shot holes have been constructed to appear like vest pocket models of drilling rigs. Other units are similarly condensed, but not to a point to affect their efficiency.

In working in some parts of the world, natives seem to resent the presence of the crews and every so often snipers take a few "pot shots" with poison arrows at the equipment boats or supply trains. Likewise, wild beasts, poisonous reptiles and snakes from time to time become unwelcome guests of the crews in their camps.

While the job appears from the outside to have all the glamour of a big game hunt, geophysicists on foreign duty will attest to the fact that it is a continuous difficult task. Some of the hazards encountered by one geophysical party while in India are illustrated.

In dense jungle or excessively swampy areas, crews and equipment were transported by native boats as near to the proposed exploratory region as possible. While everything looks serene and peaceful in this view, many dangers lurk at every turn for crews bringing equipment into the Indian jungles—or similar territories elsewhere for that matter. Waterways are one of the best means of transportation.

(Continued next page)

After leaving boats, natives carried the equipment many miles inland to the shooting area. A typical Indian Piquore load was made up for handling equipment through the shallow waters and jungles, as shown here. Utmost care must be taken to prevent any damage to the instruments, which would render them useless.

The journey ended. After hours of tiring effort, perhaps days, the delicate instruments arrived within the shooting region, and were ready to be set up on location.

Laying shooting lines through the undergrowth in jungle areas is no easy task. While natives do this work, they are instructed carefully to prevent mishaps. Note the swampy appearance of the terrain.

(Continued next page)

For drilling shot holes in dense jungle region a special type of rig is necessary because of transportation difficulties. For use in this instance, Petty Geophysical Engineering Company designed this small, portable hydraulic unit powered by a gasoline engine.

The blistering India sun makes it advisable for this shooter to carry his own shade when working in open areas. The long stick permits the umbrella to be stuck in the ground when he is not moving about.

Excessive rains handicap Asiatic geophysical exploration, particularly in low swampy terrain. Everything was going nicely at this camp site, then came the rains to flood the lowlands. Members of the crew stayed a little too long and were forced to take their belongings from the huts by boat.

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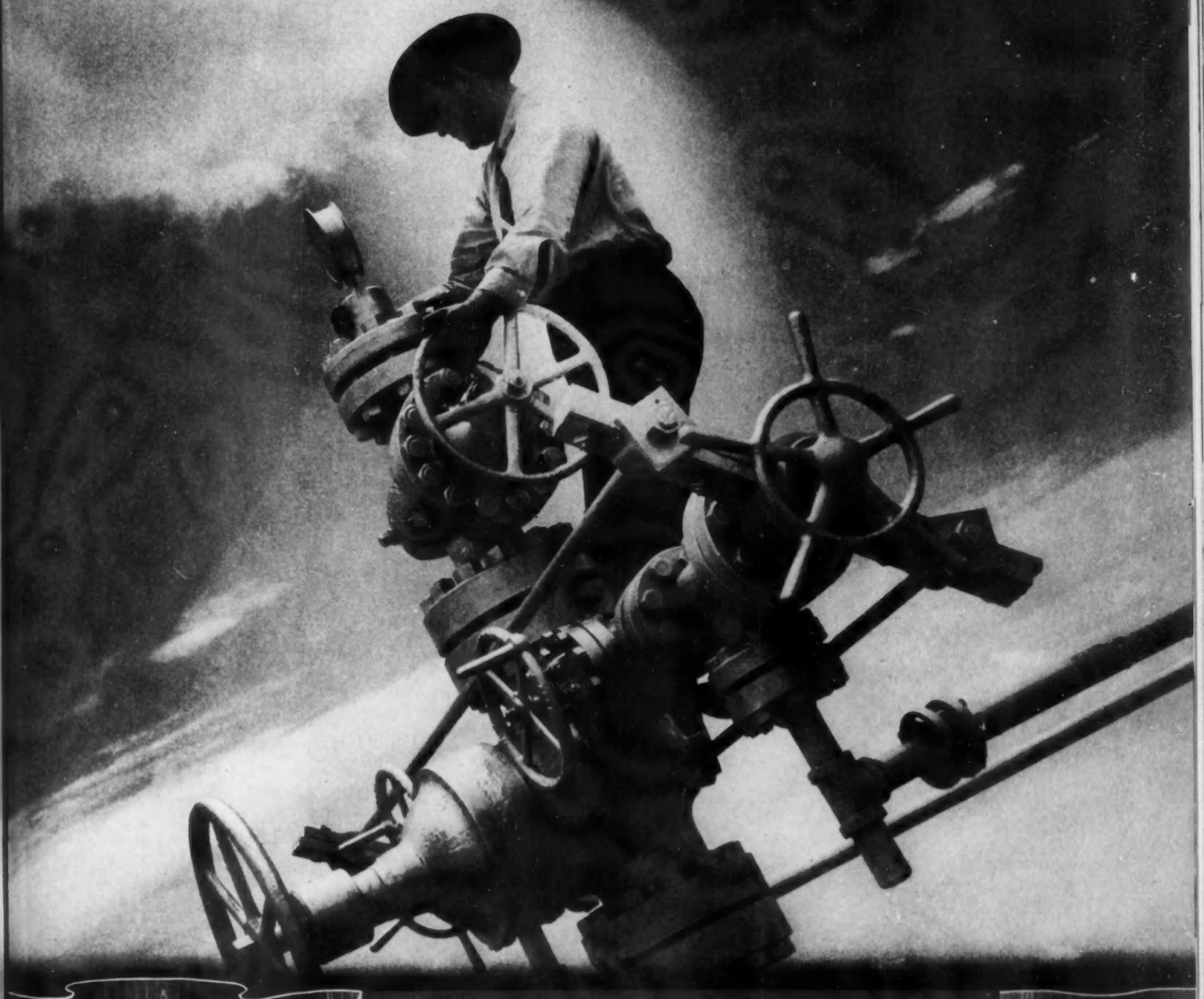
BUT, WHAT HAVE CHRISTMAS TREES TO DO WITH SEISMIC?



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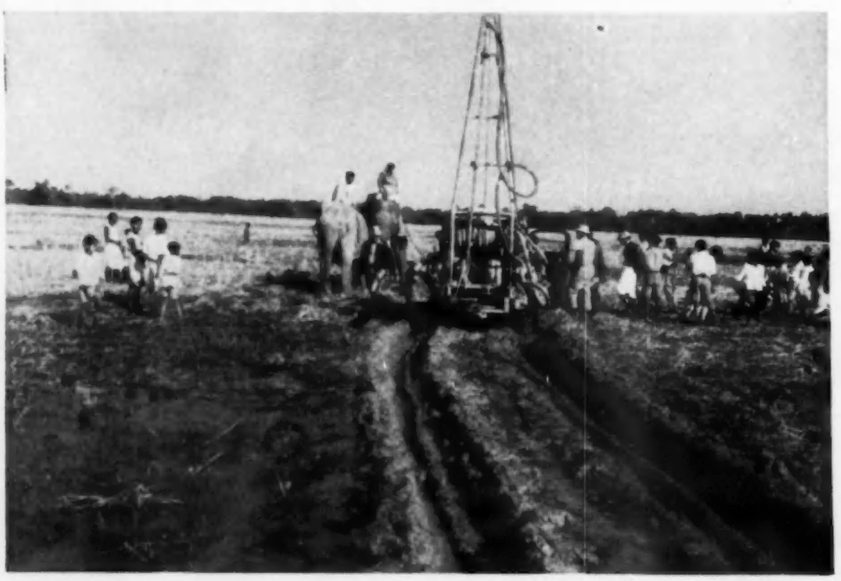
Somewhere on bottom, after an overnight flood, the electricity supply is hidden. Wade, boys, until you step on it! The remainder of the equipment had been moved during the rainstorm, but the battery cases were so black and the water rose so rapidly there was not time to find them. Next morning, the once dry area was waist deep in water.

Where roadways exist they become the "world's worst" after heavy rains saturate them. Trucks bog down to their axles, and it is next to impossible to transverse such roads as this one in Panitola, Assam, India, where a geophysical crew is firmly mired down.



Elephants to the rescue. When other means fail to pull equipment out of the mire, elephants are very welcome. In many instances drilling rigs and geophysical trucks have been snaked across impassable marshy lands of India by these giant super-strength animals.

INDEPENDENT
in SOUTH AMERICA

Views of Independent's current seismograph operations in South America. Experienced crews are available for work in foreign countries.

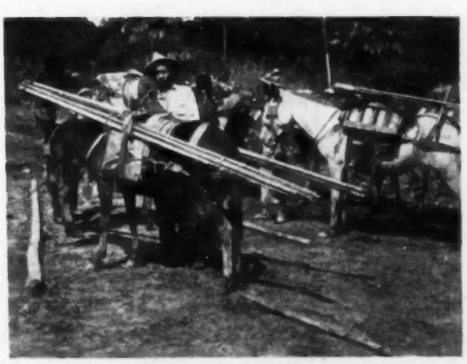
★ You are invited to send for the illustrated booklet, "Seismograph Exploration in the Search for Oil."

TRACTOR MOUNTED SHOT HOLE DRILL

MULES LOADED WITH GEOPHONES

TRANSPORTING THE AMPLIFIERS

BUILDING A BRIDGE IN THE JUNGLE



SHOOTER'S EQUIPMENT MOUNTED ON MULES

TRANSPORTATION OF CABLE REELS

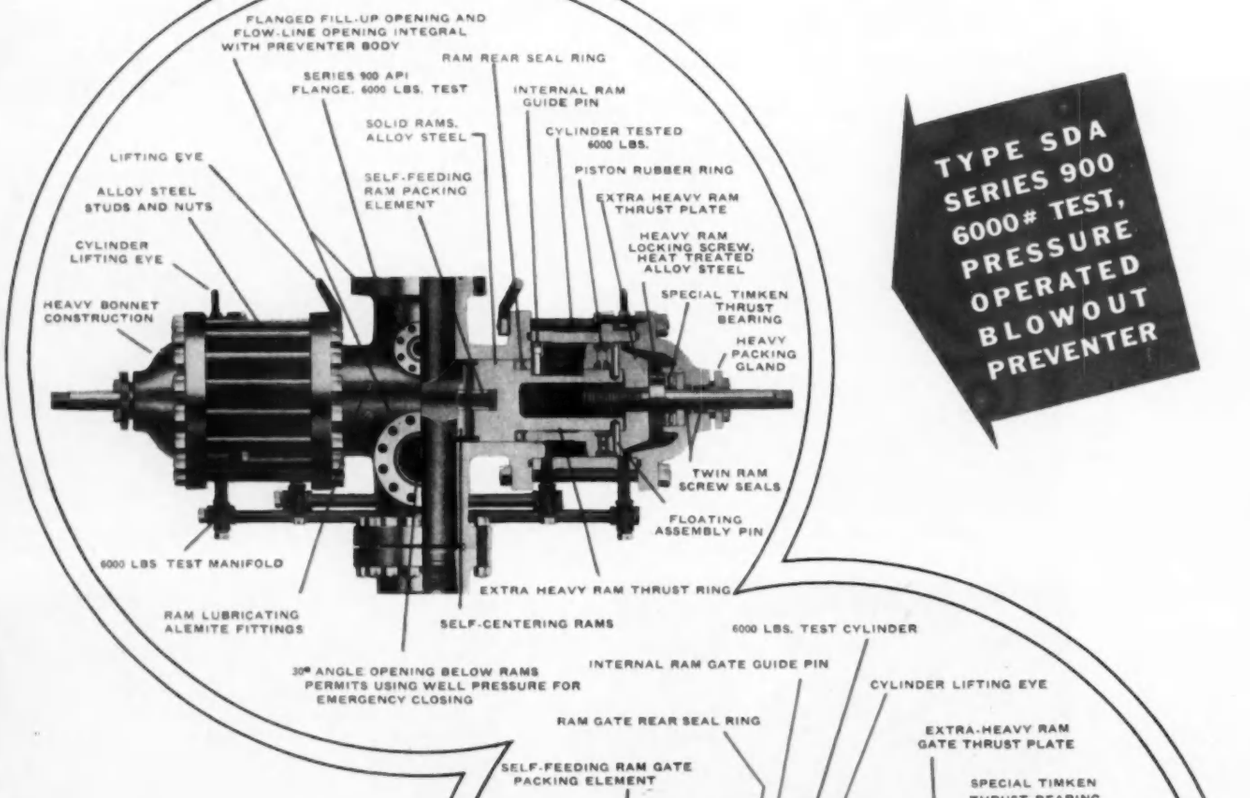
POINTING THE WAY IXO FOR THE DRILL

INDEPENDENT EXPLORATION COMPANY

ESPERSON BUILDING POINTING THE WAY FOR THE DRILL HOUSTON TEXAS

CAMERON PRESSURE DRILLING CONTROL

The Universal Symbol of

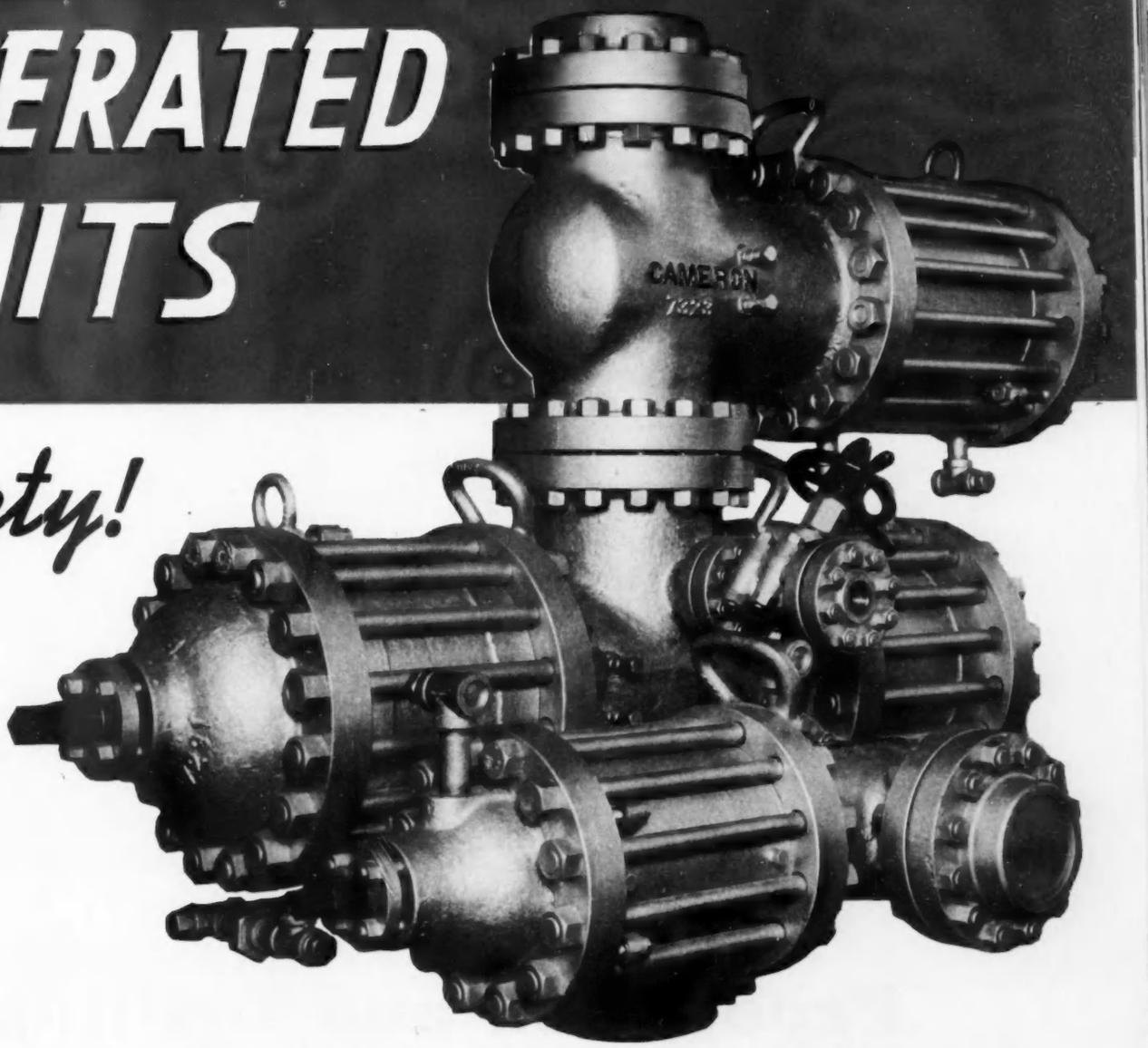

FLANGED FILL-UP OPENING AND FLOW-LINE OPENING INTEGRAL WITH PREVENTER BODY
RAM REAR SEAL RING
SERIES 900 API FLANGE, 6000 LBS. TEST
INTERNAL RAM GUIDE PIN
SOLID RAMS, ALLOY STEEL
CYLINDER TESTED 6000 LBS.
LIFTING EYE
PISTON RUBBER RING
SELF-FEEDING RAM PACKING ELEMENT
EXTRA HEAVY RAM THRUST PLATE
ALLOY STEEL STUDS AND NUTS
HEAVY RAM LOCKING SCREW, HEAT TREATED ALLOY STEEL
CYLINDER LIFTING EYE
SPECIAL TIMKEN THRUST BEARING
HEAVY BONNET CONSTRUCTION
HEAVY PACKING GLAND
TWIN RAM SCREW SEALS
FLOATING ASSEMBLY PIN
6000 LBS TEST MANIFOLD
EXTRA HEAVY RAM THRUST RING
RAM LUBRICATING ALEMITE FITTINGS
SELF-CENTERING RAMS
30° ANGLE OPENING BELOW RAMS PERMITS USING WELL PRESSURE FOR EMERGENCY CLOSING
6000 LBS. TEST CYLINDER
INTERNAL RAM GATE GUIDE PIN
CYLINDER LIFTING EYE
RAM GATE REAR SEAL RING
EXTRA-HEAVY RAM GATE THRUST PLATE
SELF-FEEDING RAM GATE PACKING ELEMENT
SPECIAL TIMKEN THRUST BEARING
SINGLE SEAT IN SELF-CLEANING GATE CAVITY
LIFTING EYE
TWIN RAM GATE SCREW SEALS
LARGE RAM GATE LOCKING SCREW, HEAT TREATED ALLOY STEEL
HEAVY PACKING GLAND
ALLOY STEEL STUDS AND NUTS
6000 LBS. TEST MANIFOLD
FLOATING ASSEMBLY PIN
PISTON RUBBER RING
RAM GATE THRUST RING
SERIES 900 API FLANGE, 6000 LBS. TEST
SOLID ALLOY STEEL RAM GATE
GATE CAVITY CHOKE PORTS

TYPE SDA SERIES 900 6000# TEST, PRESSURE OPERATED BLOWOUT PREVENTER

TYPE DV SERIES 900 6000# TEST PRESSURE OPERATED GATE VALVE

OPERATED UNITS

Safety!



The fast, positive, unfailing control provided by Cameron Series 900 A.P.I.—6,000 lb. test—Pressure Operated Blowout Preventers, Master Gate Valves and Flow-Line Gate Valves has won the unqualified endorsement of drillers, tool pushers, superintendents and others responsible for the safe drilling and completion of high pressure wells the world over.

They Close Instantly—Hydraulic pressure supplied by boiler feed pump, slush pump, or both, controlled by a 4-way valve within easy reach of the driller, closes rams instantly when pressure is applied.

Remote Control—Cameron Pressure Operated Blowout Preventers and Gate Valves are remotely controlled from the derrick floor . . . crew members are not required to enter the danger area under the floor to close them.

Positive Seal—Self-Feeding Ram Packing Element makes positive shut-off and permits pipe movement under pressure. This tough, steel-reinforced, block of special formula rubber, or neoprene if specified, represents the longest forward step in blowout prevention devised in a decade. It is designed so that when rams are closed, rubber is forced to flow to the pipe, where it makes a pressure-tight seal. Each packing element contains many cubic inches of rubber in reserve which, as needed, is automatically fed out to the pipe. This simple but extremely positive ram packing gives drilling crews complete confidence in their ability to shut-in the worst blowout. Angular wing guides, made integral with Type SDA Blowout Preventer rams, automatically center pipe in the hole and totally eliminate danger of rams being held open . . . a frequent cause of loss of control when ordinary control units are used. The wing guides are sufficiently heavy to withstand accidental shock loads, and insure positive closure.

No Upstream or Downstream Side—A Type SDA Preventer may be used right-side-up or up-side-down, if desired, since well pressure is not utilized to effect a positive seal of the annular space.

Interchangeable Rams—Rams to close around many different sizes of pipe are quickly interchangeable in any Cameron Type SDA Preventer. If desired, blind rams to make a full closure of the well bore with pipe out of the hole may be substituted for pipe rams.

Fully descriptive literature covering numerous other exclusive features of these famous drilling control units will be gladly sent on request, or complete details can be found on pages 557-571 of the 1940 edition of The Composite Catalog.

CAMERON IRON WORKS, INC. **HOUSTON, TEXAS**

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—Photo by H. Pollard, Calgary

Drilling in Canada's Turner Valley field at temperatures 40 degrees below zero.

Production and Drilling Gains Spur Canada

THE Canadian oil industry advanced on all fronts last year. Production of oil and natural gas gained 13 and 5 percent, respectively; refinery runs increased almost 7 percent; drilling activity in Alberta, Canada's principal oil province, compared favorably with the record-year 1938; a new province was added to the ranks of oil-producing areas, and an aggressive exploratory campaign was launched in yet another.

Due largely to continued gains in Alberta, Canadian crude production climed to 7,837,911 barrels to establish a new all-time record, surpassing the previous high of 6,946,479 barrels in 1938.

Alberta production gained 852,372 barrels, from 6,742,039 barrels in 1938 to 7,594,411 barrels last year. The increase was far less than the 3,945,131-barrel gain made in 1938 over 1937, although drilling last year was about the same as that of 1938. The province supplies 96.89 percent of the dominion's production. Thirty-four oil wells were drilled in Turner Valley last year, a drop of only 4 from the number of successful oil well completions in the previous year. Four oil wells were drilled in other parts of the West Canadian province during 1939, along with 6 gas wells and 2 dry holes. The relatively unfavorable showing in production gain in 1939 compared to gains made in 1938, in the wake of comparative development, reflects saturation of the Alberta crude market. The outlook for a larger market during 1940 is excellent.

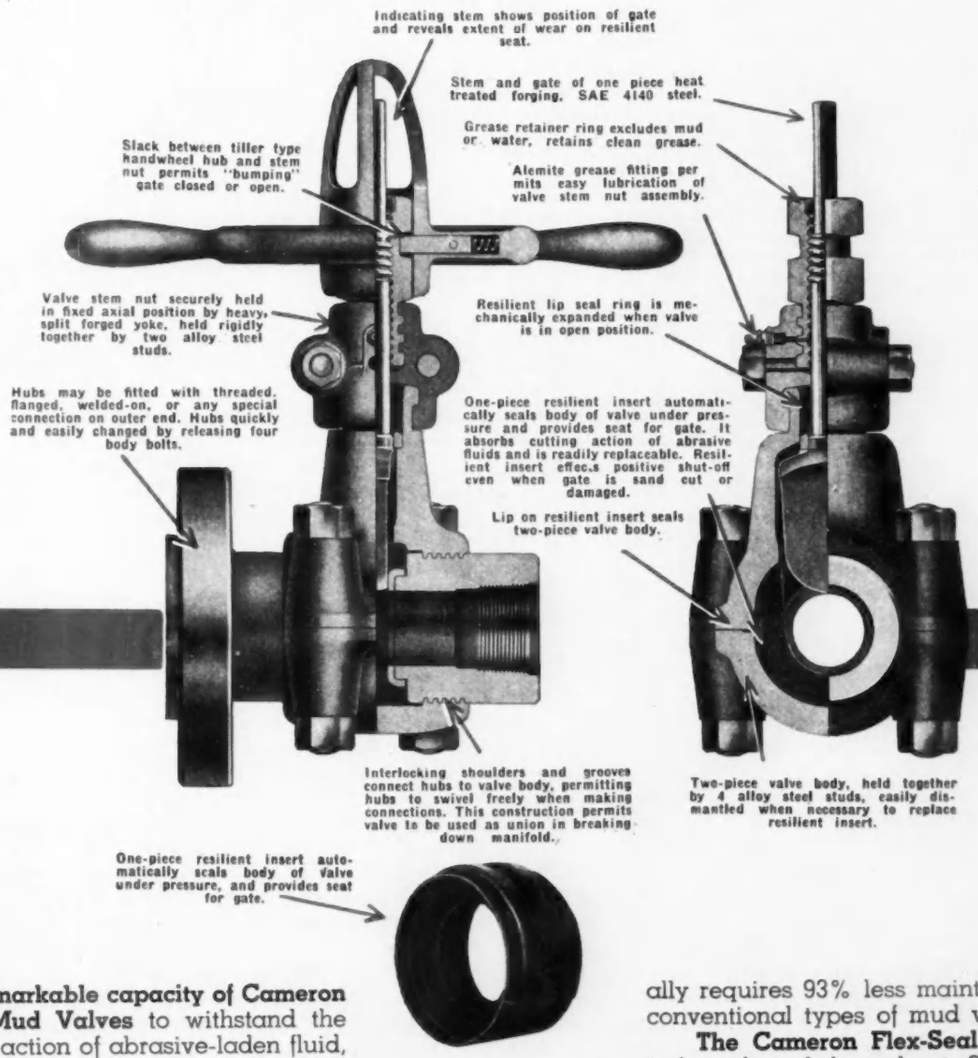
Extensive work-over of old shallow fields and a small amount of new drilling resulted in a marked gain in Ontario production, from 171,359 barrels in 1938 to an estimated 205,000 barrels last year. Ontario supplies 2.62 percent of Canada's production, and only about 2 percent of refinery throughput. A new gas field was opened in this province.

New Brunswick production, which had registered a gain of only 600 barrels in 1938, slipped 4000 barrels to an estimated 19,000 barrels in 1939. This was .24 percent of the dominion's total output.

A sizeable increase was registered in Northwest Territories, but

CAMERON-IZE

YOUR MUD LINES AS YOU DO YOUR DRILLING CONTROLS!


Indicating stem shows position of gate and reveals extent of wear on resilient seat.
Stem and gate of one piece heat treated forging, SAE 4140 steel.
Grease retainer ring excludes mud or water, retains clean grease.
Slack between tiller type handwheel hub and stem nut permits "bumping" gate closed or open.
Alemite grease fitting permits easy lubrication of valve stem nut assembly.
Valve stem nut securely held in fixed axial position by heavy, split forged yoke, held rigidly together by two alloy steel studs.
Resilient lip seal ring is mechanically expanded when valve is in open position.
Hubs may be fitted with threaded, flanged, welded-on, or any special connection on outer end. Hubs quickly and easily changed by releasing four body bolts.
One-piece resilient insert automatically seals body of valve under pressure and provides seat for gate. It absorbs cutting action of abrasive fluids and is readily replaceable. Resilient insert effects positive shut-off even when gate is sand cut or damaged.
Lip on resilient insert seals two-piece valve body.
Interlocking shoulders and grooves connect hubs to valve body, permitting hubs to swivel freely when making connections. This construction permits valve to be used as union in breaking down manifold.
Two-piece valve body, held together by 4 alloy steel studs, easily dismantled when necessary to replace resilient insert.
One-piece resilient insert automatically seals body of valve under pressure, and provides seat for gate.

The remarkable capacity of Cameron Flex-Seal Mud Valves to withstand the destructive action of abrasive-laden fluid, moving at high pressure and velocity, is attributed to its unique renewable resilient flow-way insert.

At a very slow rate of wear, this rubber, or neoprene, insert absorbs the cutting action of abrasive laden fluid, and provides a leak-proof seat for the gate. Cuttings or other foreign matter are readily embedded in the resilient insert upon closing the gate. When the resilient insert is finally worn out, it may be replaced quickly and at low cost in the field with ordinary rig tools. Unbiased tests under the most severe field conditions have revealed that the Cameron Flex-Seal Mud Valve actually requires 93% less maintenance than conventional types of mud valves.

The Cameron Flex-Seal Mud Valve is forged steel throughout. All parts subjected to wear are of heat-treated alloy steel. It is the only gate type valve without a metal-to-metal seal. Interlocking shoulders and grooves between the body and hubs permit the valve to swivel like a union when making up in a manifold. This unique construction also permits the valve body to be readily fitted with flanged, threaded, welded-on or any special hubs desired.

Cameron Flex-Seal Mud Valves are available in 2", 3" and 4" sizes, 6000 Lbs. test pressure.

Complete details will gladly be sent to interested operators on request.

CAMERON IRON WORKS, INC. HOUSTON, TEXAS

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production from the region played only a very small part in the dominion's production. Crude output advanced from 10,000 barrels to an estimated 17,000 barrels, which represented .22 percent of Canada's total.

Saskatchewan entered the ranks of oil-producing provinces when a well on the Lloydminster structure was drilled across the Alberta boundary. The field, which has several oil and gas wells on the Alberta side of the line, will see additional drilling this year. A refinery is under construction. Production of the single well, a 200-barrel producer, is estimated at 2500 barrels during 1939, or .03 percent of Canada's production for the past year.

A break-down of Canadian production for the past three years, by provinces, is given in Table 1.

TABLE 1
Production of Canadian Provinces

PROVINCE	1937, Barrels	1938, Barrels	Gain, 1937–1938	1939, Barrels	Gain, 1938–1939	Percentage of Canada
Alberta	2,796,908	6,742,039	3,945,131	7,594,411	852,372	96.89
Ontario	165,478	171,359	5,881	205,000*	33,641	2.62
New Brunswick	22,481	23,081	600	19,000*	—4,081	.24
Northwest Territories	11,371	10,000	—1,371	17,000*	7,000	.22
Saskatchewan	None	None	.....	2,500*	2,500	.03
Total	2,996,238	6,946,479	3,950,241	7,837,911	891,432	100.00

*Estimated.

The British Columbia government has authorized a $200,000 exploratory program, with attention being directed to the Peace River (Pouce Coupe) area in the northern part of the province near the Alberta boundary. Contract for a 7500-foot test has been let, and contractor was moving in equipment early this month.

Production of natural gas registered gains in four provinces, and remained constant in two others. Total production for 1939 was 35,187,600 million cubic feet, valued at $12,250,000, compared to 33,444,791 million cubic feet, valued at $11,587,450, in 1938. Gains were made in Alberta, Ontario, New Brunswick and Saskatchewan, while gas production in Northwest Territories and Manitoba equalled 1938. Details on natural gas production in 1938 and 1939 are given in Table 2.

TABLE 2
Production of Natural Gas in Canada, 1938 and 1939

PROVINCE	1938 Million Cu. Ft.	1938 Value in Dollars	1939 Million Cu. Ft.	1939 Value in Dollars
New Brunswick	577,492	284,689	610,500	299,000
Ontario	10,952,806	6,460,764	11,700,000	6,902,000
Manitoba	600	180	600	180
Saskatchewan	90,285	34,136	100,000	37,800
Alberta	21,822,108	4,807,346	22,775,000	5,010,685
Northwest Territories	1,500	335	1,500	335
Total, Canada	33,444,791	11,587,450	35,187,600	12,250,000

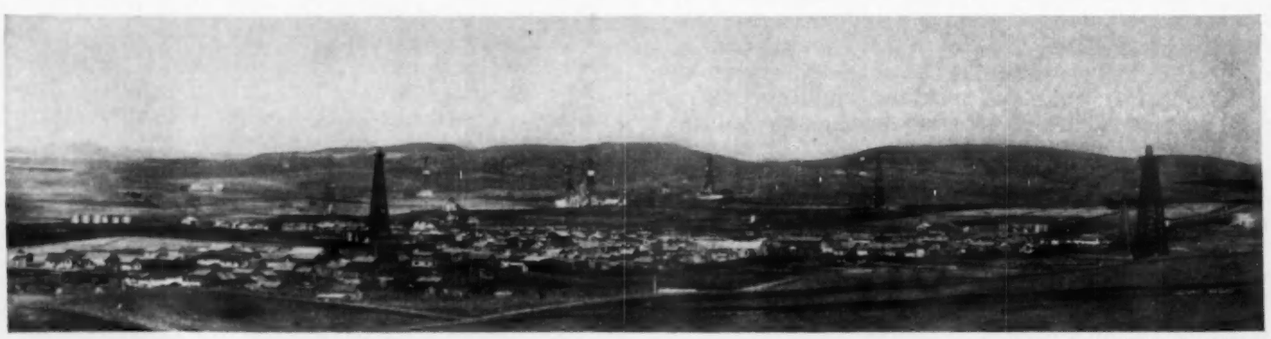
Canadian refinery runs during 1939 approximated 43,700,000 barrels, compared to 41,000,000 barrels in 1938. Improved business conditions and heavier requirements for agricultural operations increased consumption, boosting refinery runs. The dominion fell 36,000,000 barrels short of meeting its demand for crude, and drew upon United States fields and South America for more than 80 percent of its requirements.

As yet there is no curtailment on private use of gasoline, such as is the case in European belligerent countries. Such rationing may occur during the present year, however, as Canada adjusts herself to a war basis.

Curtailment of gasoline for private use in the event the European war is prolonged may be expected for two reasons: Imports of oil from the United States would be held to a minimum in an effort to prevent further disturbance of Canada's unfavorable trade balance with this country. A reduction in imports from South America would release tanker capacity for transport of oil to British fighting forces in Europe.

While rationing of gasoline may become a reality in Canada this year, the factors responsible would spur development in Turner Valley and other western oil and potential oil areas. The market for Alberta oil during 1939 consisted of eastern British Columbia, Alberta, Saskatchewan and western Manitoba. The eastern part of Manitoba was served by products refined from Illinois crude, which could be laid down at lower cost than products refined in Regina from Alberta crude. The present line running through Manitoba marking division of that province for Canadian oil of the western provinces and United States oil refined in Ontario may be expected to move eastward as exchange makes advisable reduced imports from the United States or as tankers now transporting crude from South America to eastern Canada refineries are assigned to trans-Atlantic service.

An immediate increased market for Alberta crude is indicated in government plans for six flying schools to be established in Alberta as part of its war program. Three schools for advanced training are to be equipped with 100 planes each, and three elementary flying training schools are to have 30 planes each. Alberta refineries are undertaking plant improvements to manufacture the high-octane gasoline needed for this purpose.



—Photo by H. Pollard, Calgary

"CAMERON-IZE"

FOR SAFE COMPLETIONS AS YOU DO FOR SAFE DRILLING!

Utilizing many of the mechanical features of the famous CAMERON DRILLING CONTROL UNITS, Cameron now offers a complete line of CASING AND TUBING HEAD NESTS which provide the **same degree of positive protection during every step of the completion operation.**

The new, low-cost Type "LD" Ram Type Tubing Control Head serves a four-fold purpose: (1) It provides the ultimate in safe, dependable control during every step of the completion operation; (2) it provides three proven methods of suspending and sealing the tubing string; (3) it obviates the need of a cement retainer when making a squeeze job; (4) it is extremely practical on any reworking subsequent to original completion of the well.

Cameron Types "U" and "UP" Boll-Weevil Tubing Heads, which present an **improved sealing means** over the conventional boll-weevil hanger, are available for operators who require that method of tubing suspension. The cross-section drawing on the extreme right below, illustrates these two types.

Cameron Casing Heads and Spools feature a welded seal of the space between casing strings, and a secondary plastic packing seal which may be safely repacked under full rated pressure at any time. With the Type "M" Welding Flange (See illustration below, left), they provide a **pre-tested** welded seal of the space between casing strings. All casing head housings and spools readily accommodate **either slip or boll-weevil hangers.** Further, the 6000 Lb. test housings and spools offer two types of slip suspension; a long, heavy-duty type for suspending casing loads of any magnitude, and a regular type for loads up to 250,000 lbs. The Casing Head housing may be furnished with landing base, if desired. For additional safety, all casing size threaded connections above the surface pipe have been eliminated.

Full particulars on all types of Cameron Tubing Heads, Casing Heads and Spools, as well as the Cameron Closed Pressure Method of Drilling and Completion, will gladly be provided on request.

CAMERON IRON WORKS, INC. 711 Milby Street HOUSTON, TEXAS

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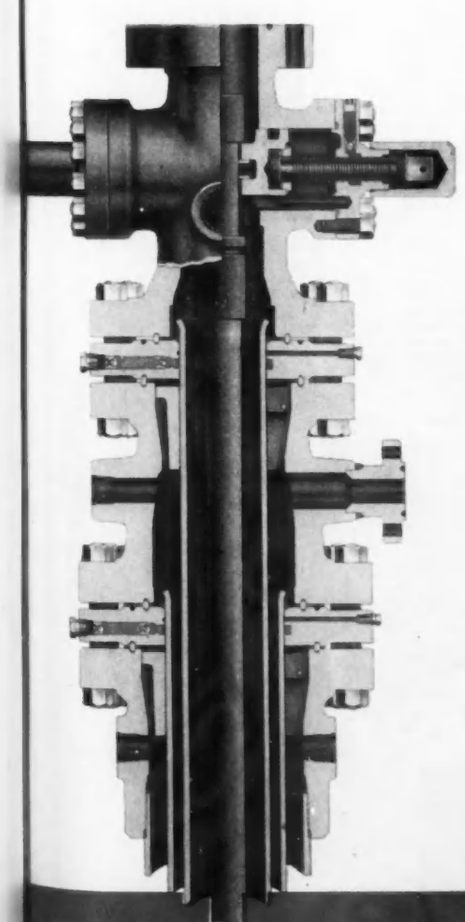
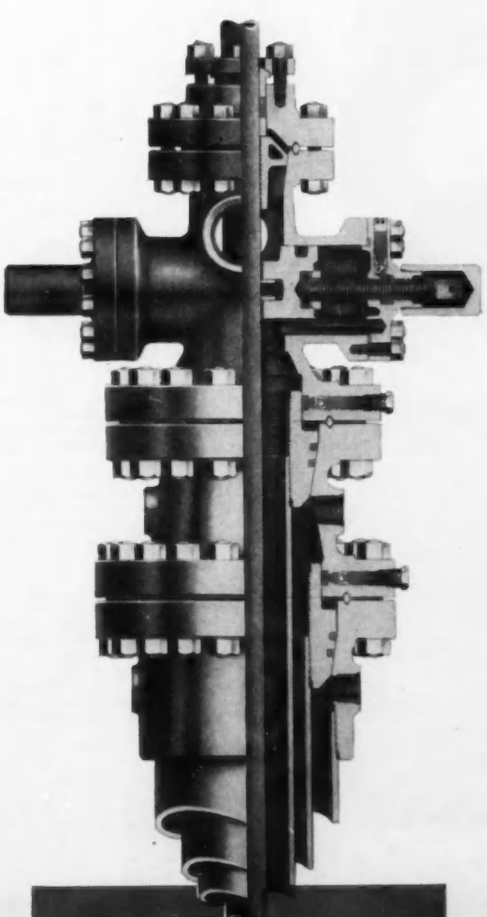
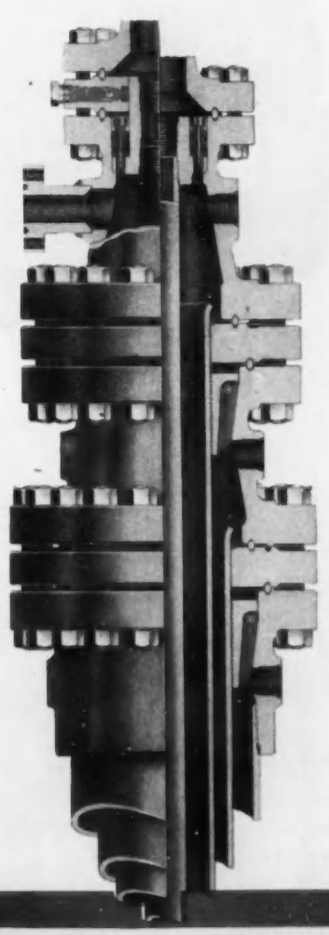


CAMERON Completion Equipment for use on extremely high pressure wells and for suspending casing loads of any magnitude. Tubing suspended and sealed on closed rams of Control Head. Slip suspension of casing strings. Welded seal of space between casing strings and secondary repackable plastic packing seal, utilizing Type "M" Welding Flange with unique test-weld feature. A.P.I. ring gaskets between flanges.



CAMERON Completion Equipment, providing slip suspension of tubing to facilitate setting formation packer, and boll-weevil suspension of casing strings. Rams of the Control Head are utilized as an annular space master gate, with outlets provided above rams. REPACKABLE plastic packing seal provided around shank of boll-weevil hangers.

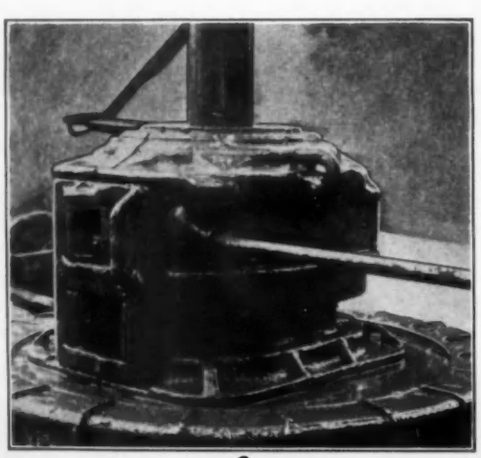


CAMERON Completion Equipment, illustrating two types of Boll-Weevil Tubing Heads. Right—Type "U" effects seal by making up on recessed socket head set screws to compress neoprene packing; Left—Type "UP" is the same as Type "U" but is provided with repackable plastic packing seal above primary seal. Type "J" slips and welding flange suspend and seal casing strings.

OUT IN FRONT

1

2



3

BJ OIL TOOLS for 1940 are the best of their kind ever offered to the Petroleum Industry. Years of practical experience insure correctness of design for ease of operation and the highest standards of safety—modern metallurgy and heat treatment brings you new standards of construction!

Study the brief descriptions on these pages, then refer to the 1940 Composite Catalog or the BJ Catalog for sizes and buying information. *Your* Supply Company is ready to see that you get *any* BJ Tools promptly.

1 This is the new BJ Light Type Elevator for handling external upset drill pipe without using lifting plugs. The body is bored to fit the contour of drill pipe with the standard external angle of 18 degrees. Made in two sizes for 20-ton loads of 2⅜" or 2⅞" pipe, this elevator has all the features of convenience and safety found in the Heavy Type which carries loads up to 200 tons. See page 483, 1940 Composite Catalog.

2 The new BJ Type LA Elevator is similar in design and operation to the widely famous Type A, but is intended to handle lighter loads. It is ideal for lighter weight strings of drill pipe and tubing, and is priced substantially lower than corresponding sizes of the heavier constructed Type A. See page 481, 1940 Composite Catalog.

3 Here is the latest in safety and convenience for setting strings of casing of any length—the new BJ Casing Spider! Operators everywhere instantly appreciate its three vital advantages: (1) It grips instantly and positively; (2) It operates rapidly and easily; (3) It is readily removed by opening the door.

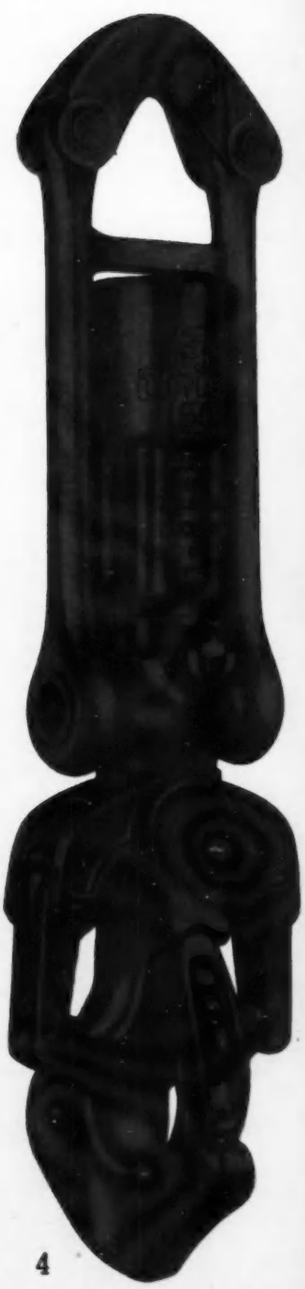
Four extra-long slips grip instantly and uniformly without crushing. When running casing a single lever is held down to retract all of the slips, which grip when the lever is released. The door cannot be opened while the slips are in the engaged position supporting the casing.

Made with a rated capacity of 300 tons, with separate sets of slips for casing from 5½" to 13⅜" A.P.I. See pages 496 to 497 of the 1940 Composite Catalog.

4 The BJ 150 Triplex Hook, with separate hooks and locking arms for each of the links and the swivel bail, is designed for wells of average depth where the normal loads to be carried do not exceed 150 tons. Other BJ Triplex Hooks include the "300" safe for the longest, heaviest strings of drill pipe or casing ever run in an oil well; the "100" for shallower wells where 100-ton loads are the maximum; and the "50" for use in short derricks on portable drilling rigs and for exploratory work.

No operator, and no crew, now need take chances with open-type hooks, equipped with so-called safety latches. Read the story of BJ Triplex Hooks on pages 466 to 471 of the 1940 Composite Catalog.

5 Here is the popular "50" BJ Tubing Hook, recommended for 50-ton loads, and equipped with the BJ "Locking Arm" which transforms the hook into a closed C-link which greatly increases strength and prevents the elevator links (bails) from "jumping" the hook. The "75" is intended for tubing strings up to 75-tons in weight; the smaller "30" is for 30-ton loads. See pages 472 and 473 of the 1940 Composite Catalog.

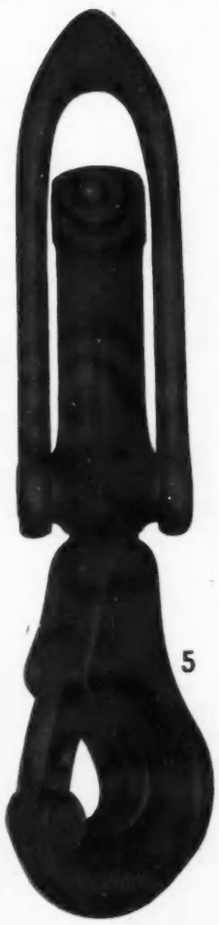


4

In Step With
MODERN METHODS

BJ DRILLING, CORING AND PRODUCTION

FOR 1940!



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6 BJ Rod Hooks are in a class by themselves for the safe, fast handling of rod strings of any length. The "15" (illustrated) is for 15-ton loads; the "10" carries 10-ton loads; while the "20" has an enclosed relief spring which helps to avoid burring threads and speeds up operations. See pages 474 and 475 of the 1940 Composite Catalog.

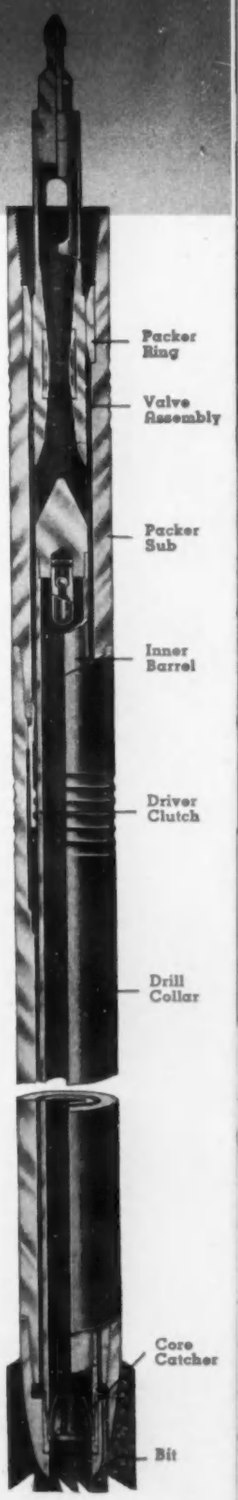
7 & 8 One of the newest BJ developments is this Kelly Bushing with a rubber cushion, which fits into the corrugated inner bore of the body, and absorbs the shock as the rotating Kelly moves downward smoothly and evenly through anti-friction liners. Illustration 8 shows how the oil-resistant rubber cushion fits between the matching corrugations of the slips and the body and absorbs the driving torque; radial thrust is taken on metal bearing surfaces at the top and bottom of the body.

Page 34 of the 1940 Composite Catalog contains full details on this efficient Kelly Bushing, which is being widely purchased by modern operators.

9 Here is a strong, safe tong which is heavy enough to break-down or make-up drill collars, yet fast enough for handling casing. Many new features of the BJ Extra Heavy Rotary and Casing Tongs are included on pages 508 and 509 of the 1940 Composite Catalog.

10 Just as wire line coring methods are preferred over old-style conventional coring, just so is the BJ Elliott Wire Line Core Drill preferred over others by geologists, crews and owners who know of its many important advantages. Without removing the drilling string from the well you can drill straight, full-gauge hole—then core—then drill or core in any order and for any footage you desire. A patented Venturi type valve reduces the pressure inside of the core-taking barrel as much as 40 pounds per square inch below the pressure outside of this barrel. The resultant suction is exerted upon the core as it enters the barrel so that accurate, uncontaminated cores are secured even from sand and other unconsolidated formations.

This simple, money-saving device is completely illustrated and described on pages 532 to 541 of the 1940 Composite Catalog.



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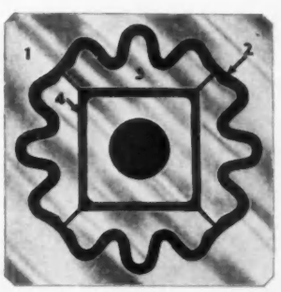

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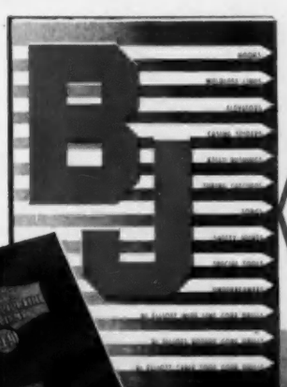

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TOOLS

Alberta Has Attained Stabilized Position

By F. K. BEACH

Petroleum and Natural Gas Division,
Department of Lands and Mines, Alberta

ALTHOUGH Alberta has annually yielded some commercial production since 1914, and from 1925 has had quite material amounts of "naphtha" or "distillate" from Turner Valley gas wells, it was not until September, 1937, that production began to approach demand for oil within the province.

In the 2⅓ years elapsed since then, a change over from the state of importer to exporter has been accomplished in an orderly manner. Mistakes made in many other flush fields have largely been avoided. Gas energy needed to bring oil from the producing horizon to the surface has been conserved. The markets have not been flooded with more oil than they could readily absorb and consequently the price structure has held steady. Contracts for purchase of foreign oil in existence in 1937 were terminated as soon as legally possible. Pipe line facilities from Turner Valley to Calgary were increased.

Alberta production had been running less than 1,000,000 barrels a year until 1930, when development in the wet gas area boosted output to close to 1,500,000 barrels. It remained near that figure in 1931, then dropping again to less than 1,000,000 barrels. The annual increase was small during the years following, until 1937 when opening of the oil area in Turner Valley boosted production more than 100 percent over the previous year, to 2,796,908 barrels. An even more spectacular increase took place in 1938, when 6,742,039 barrels were produced.

Production in 1939, while registering a gain to 7,594,411 barrels over the previous year, was curtailed to market demand. The 12-month period was marked by production control with output held to market demand. The increase, therefore, represented a slightly better demand for Alberta oil, and did not take into consideration the province's capacity to produce oil.

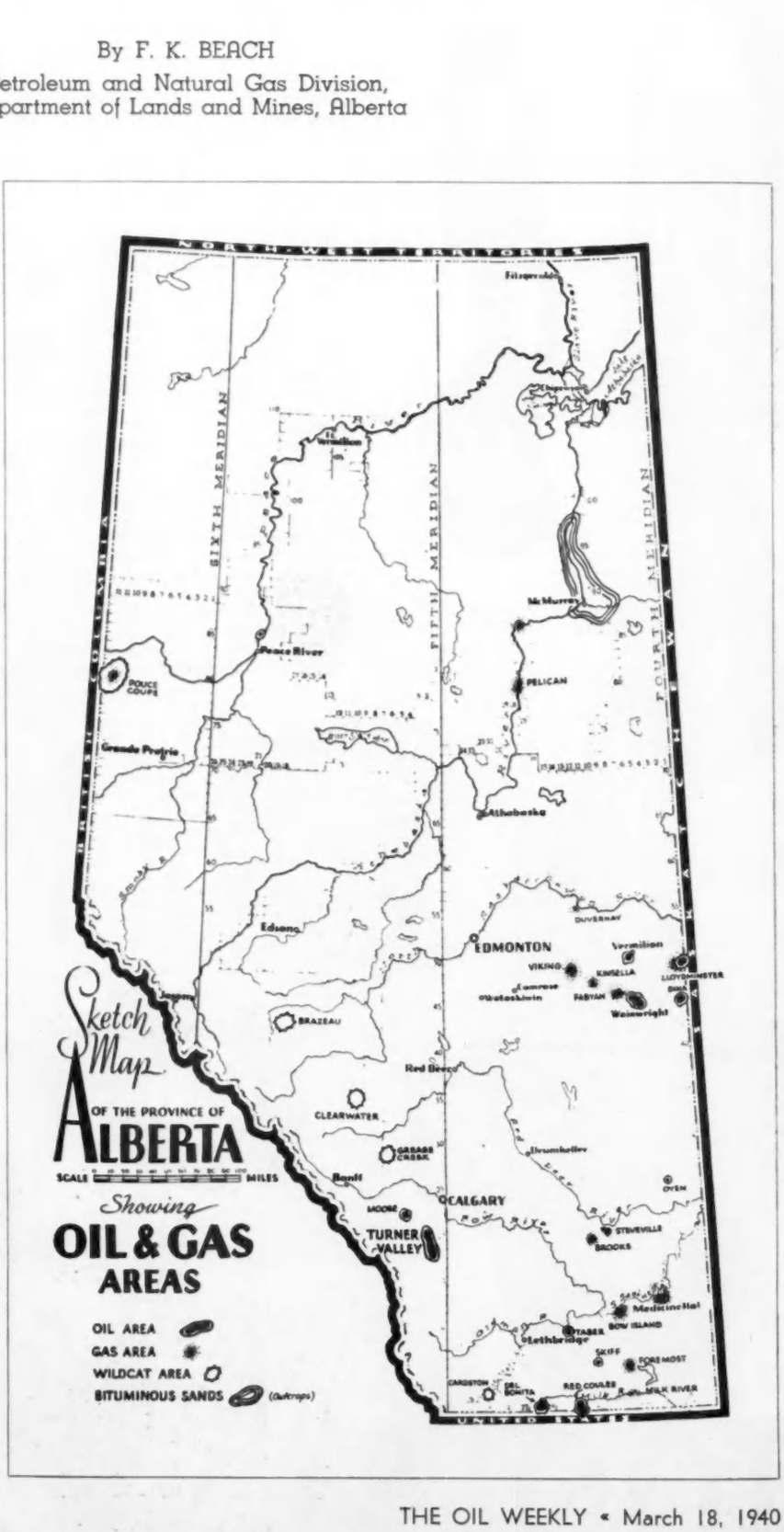


TABLE 1
Summary of Oil Production in Alberta
Quantities in barrels of 35 Imperial Gallons

YEAR	TURNER VALLEY Limestone Oil Wells	TURNER VALLEY Limestone Gas Wells	TURNER VALLEY Limestone Natural Gasoline	TURNER VALLEY Shallow Crude	RED COULEE Light Crude	WAINWRIGHT Heavy Crude	MISC. Mostly Heavy Crude	Total
1914-21	.....	.....	.....	56,599	.....	.....	.....	56,599
1922	.....	.....	9,294*	6,559	.....	.....	.....	15,853
1923	.....	.....	8,060	1,943	.....	.....	.....	10,003
1924	.....	.....	13,205	844	.....	.....	.....	14,049
1925	.....	156,766	8,951	2,926	.....	.....	.....	168,643
1926	.....	203,725	7,283	2,609	.....	5,981	.....	219,598
1927	.....	284,416	5,854	38,808	.....	2,526	529	332,133
1928	.....	410,623	.....	70,734	.....	7,952	222	489,531
1929	.....	908,741	.....	72,480	1,328	12,332	4,271	999,152
1930	62,539	1,251,500	.....	50,545	53,917	9,739	5,604	1,433,844
1931	85,258	1,260,431	.....	26,936	65,066	7,142	10,362	1,455,195
1932	60,494	793,622	.....	21,694	34,877†	6,935	.....	917,622
1933	55,213	711,891	185,781	23,822	31,057†	5,276	.....	1,013,040
1934	78,624	717,818	414,324	21,896	20,989	11,779	510	1,265,940
1935	124,893	586,747	496,681	18,691	20,536	14,638	1,564	1,263,750
1936	319,845	351,914	602,360	13,119	17,937	14,957	310	1,320,442
1937	1,916,110	183,353	657,169	10,589	13,790	13,559	2,338	2,796,908
1938	6,029,010	121,439	531,434	9,192	13,818	12,985	24,161	6,742,039
1939	7,180,161	70,650	296,787	8,431	13,022	11,624	13,736	7,594,411
Total	15,912,147	8,013,636	3,237,183	458,417	286,337	137,425	63,607	28,108,752

Note—The division between oil wells and gas wells in Turner Valley limestone is only approximate.
* From 1922 to 1927, natural gasoline was derived from horizons above the limestone: from 1933 onward, from the limestone.
† Includes some light crude from miscellaneous localities.

Details of Alberta production by years is given in Table 1.

In 1939 British American Oil Company shut down a refinery at Coutts which had been using Montana crude and erected one in Calgary. Imperial Oil, Ltd., made important additions to its Calgary refinery, needed to produce gasoline suitable for and in quantity demanded by the market. Gas and Oil Products Company also built a modern cracking plant in Turner Valley. These new refinery facilities have proven that a high-octane gasoline can be made from Alberta crude without the need of blending imported stocks. Some imports still enter the province, but exports greatly exceed the imports, and the imports could be cut off without affecting the price structure of crude or of finished gasoline. Exports are largely to the neighboring province of Saskatchewan, where two large refineries and a number of small ones use principally Alberta crude.

The Saskatchewan refineries serve that province and extend their marketing facilities into western Manitoba. Some exports also go to the Northwest Territories where rapid advance in metal mining has created a demand of considerable proportions. During the year a cracking plant was installed at Norman Wells for manufacture of aviation gasoline from oil produced on the spot.

Drilling Expensive

The change over from importer to exporter was not made without some growing pains, but effective leadership within the industry and in the Alberta government succeeded in accomplishing the items above mentioned with a minimum of friction. The Petroleum and Natural Gas Conservation Board was given a legal standing by the government of the province. In general, its proration orders have been accepted by operators who have recognized the fairness of quotas issued. The board has in addition controlled the spacing of wells, confining drilling in Turner Valley to 1 well per 40 acres. Considering that the average depth of 34 completed oil wells in Turner Valley in 1939 was 7868 feet, with a cost of $125,000 to $150,000 per well, that ruling of the board has been accepted as a fair one.

The board also has enforced straight-hole drilling, and holes deviating more than 2 degrees from the vertical at any point are unusual.

The past year saw all previous records broken in feet of hole drilled in Alberta. Footage dropped 7 percent in Turner Valley, but regained this and more in other parts of the province. The year's total was 374,287 feet of hole, compared to 363,292 feet a year ago and 370,594 feet in 1929, the previous record year. Annual figures on feet of hole drilled in Alberta are given in Table 2.

TABLE 2
Feet of Hole Drilled in Alberta

YEAR	Turner Valley	Foothills West of T. V.	Rest of Alberta	Total
Prior to 1927	115,391	38,969	493,272	647,630
1927	53,340	6,898	24,728	84,996
1928	111,160	2,930	53,450	167,540
1929	240,020	49,997	80,580	370,597
1930	123,583	22,615	83,136	229,334
1931	61,939	4,244	50,369	116,552
1932	13,096	845	18,680	32,621
1933	51,806	1,743	18,300	71,849
1934	78,278	4,093	13,853	96,221
1935	27,462	7,242	25,769	60,473
1936	52,470	8,208	37,937	98,615
1937	245,531	8,851	37,572	291,959
1938	303,112	8,968	51,212	363,292
1939	281,274	25,891	67,122	374,287

Wildcatting

Considerable wildcatting has been carried on for years. The province might be divided as an oil prospect into three general divisions; (a) the disturbed belt which roughly parallels the Rocky Mountains, and which has foothills as its topographic expression; (b) the Alberta Geocyncline, a basin or trough lying to the east of the disturbed belt; and (c) the plains area, covering the rest of the province with the exception of a triangle in the northeast corner of the province covering some 9000 or 10,000 square miles of Pre-Cambrian outcrop.

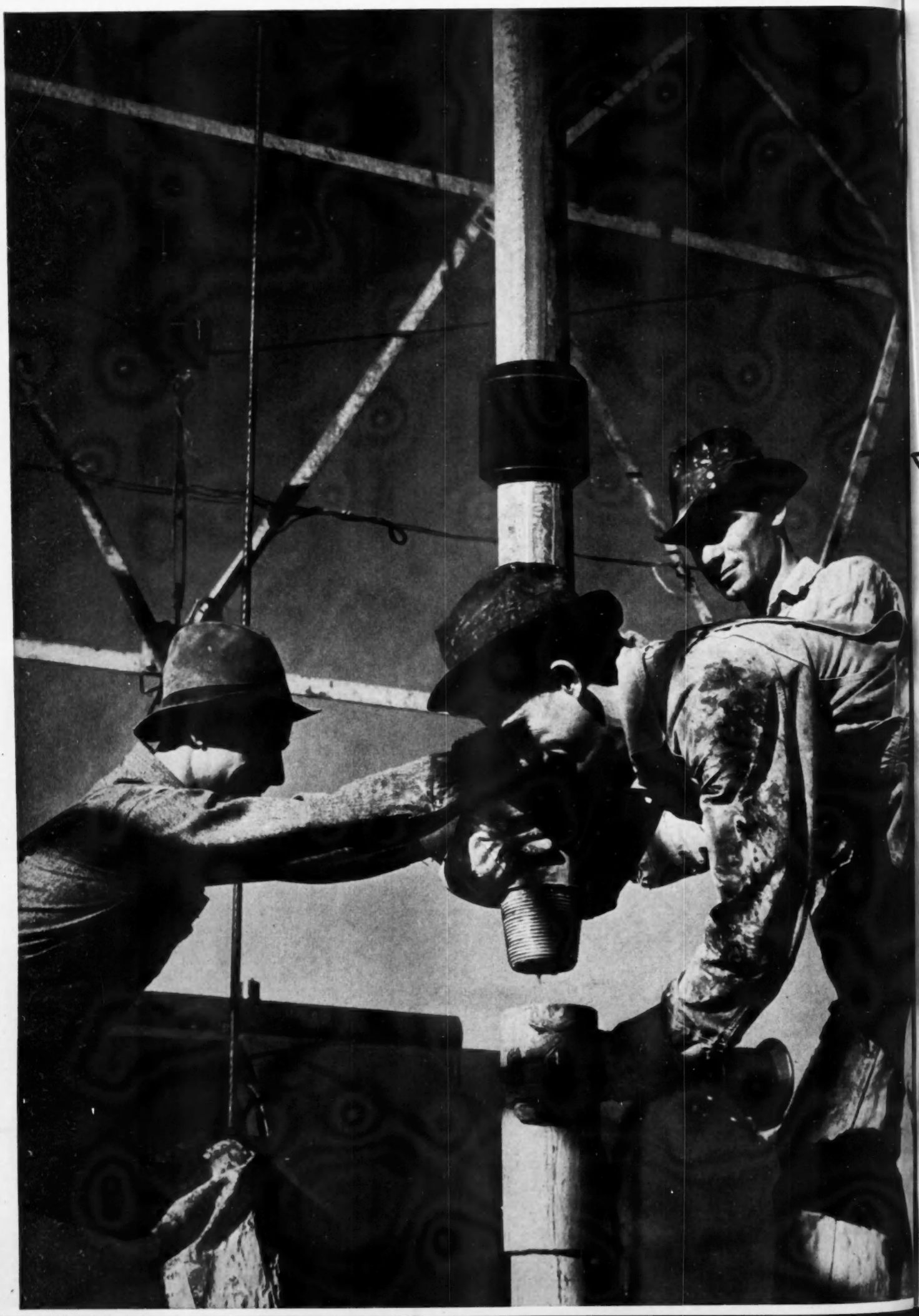
The major field now producing is in the disturbed belt, and much attention has been given to this division of the province. Several holes in 1939 gave negative results, faulting having cut off the producing limestone so that it could be reached by the drill only at depths which would be excessive.

Some tests have been made in the geosyncline. There is always the hope for an analogy to the Michigan and Illinois basins. Favorable indications have been found in two such tests but no production as yet. In both the tests referred to, the oil has been of fairly light gravity. It should be noted that nearly 9000 feet of sediments overlie the limestone in the deepest part of the geosyncline.

In the plains area the depths are not so great and tests are more widely scattered. Several fields have been developed, in most cases the oil being heavy, in fairly thin sands, with resulting small yield per day. Wainwright is the largest field discovered, but there has been no recent drilling for exploitation of the known reserves. Two wells near Lloydminster and one 30 miles west discovered oil in 1939, but no estimate of proven area can be made at present. Light-gravity oil was encountered near Del Bonita in two wells, but again, the proven area cannot be estimated.

Turner Valley

Distance between extreme north and south ends is about 16 miles. Of this about 5½ miles along the



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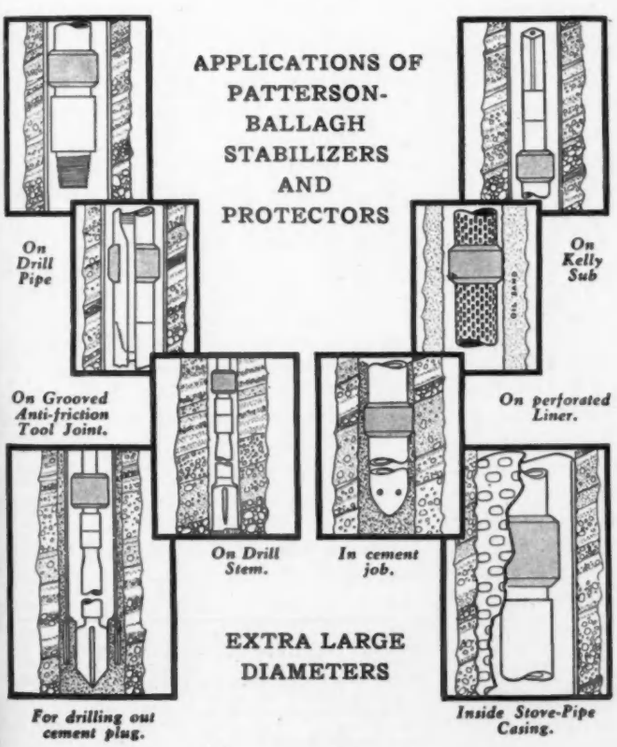

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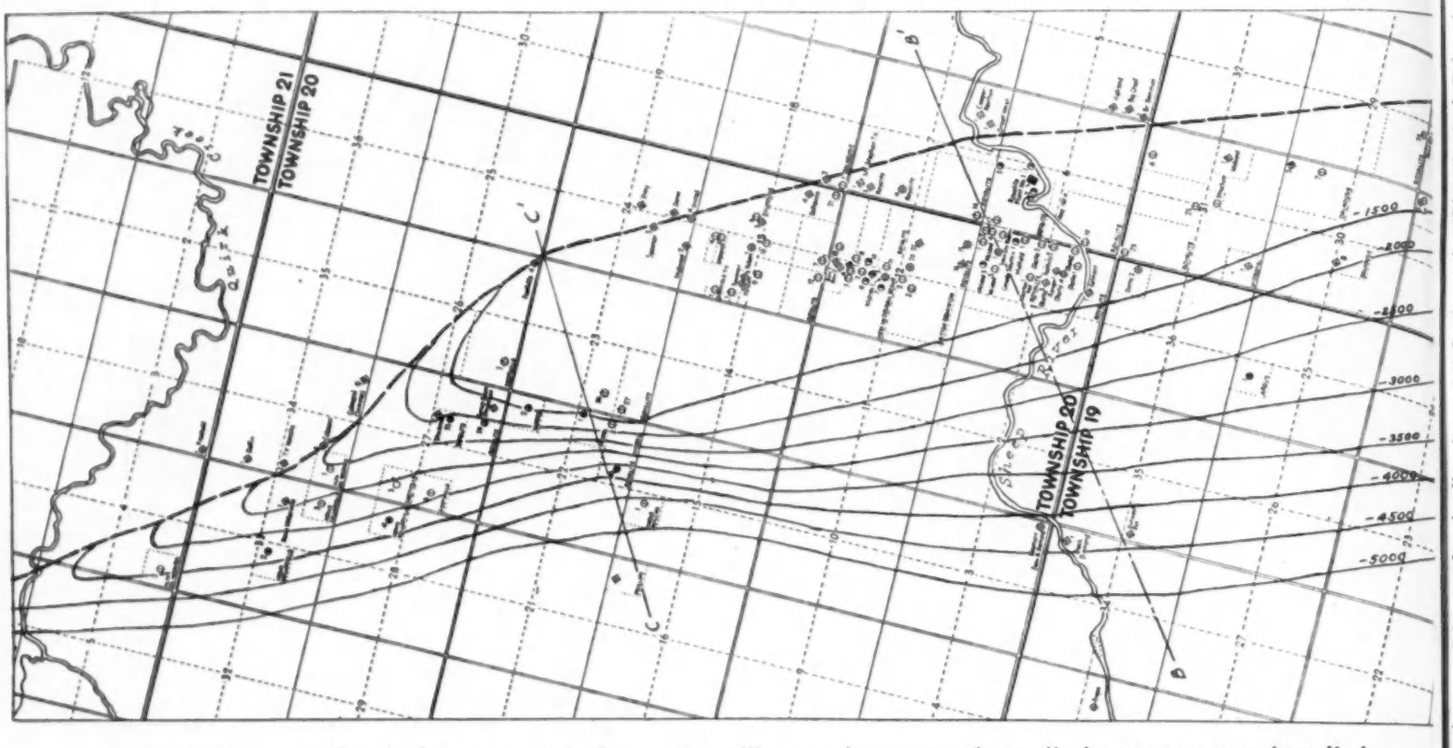


structure by a width of about a mile is proven at the south end, and something over 2 miles along the structure by something less than a mile in width is proven at the north end. Oil production is limited on the east by a gas cap, which in turn ends at a sole fault farther east. On the west, production is limited by salt water which has been encountered in two deep wells and is being produced in one well in proportions of about 10 percent of total liquid. Between the two proven areas there have been several wells which have found so little permeability as to make them either non-commercial or on the border line. The extreme south end of the field appears to have been marked. At the north pool, the dip of the limestone is much steeper than at the south pool, but there may be a wider productive area than at first seemed likely, due to thrust faulting.

Red Coulee

This field was discovered in 1929 and drilled up in 1930. Most of the field proved to be in Montana with only 80 or 100 acres extending into Alberta. Oil is about 30 degrees A.P.I.

Wainwright

Discovered in 1922, oil has been proven over an area fully 4 miles long by nearly as wide, but the gravity is low (18° to 22°), and yield slow (to 25 barrels per day) from thin sands of Lower Cretaceous age—continental deposits that are inclined to lens out. There has been no recent drilling for exploitation of known producing horizons and the wells still pumping are within an area of less than 1000 acres. Exploitation with modern methods might add greatly to the producing area and quantity produced. Wells in this field show a remarkably slow rate of depletion. One well that had an initial production of 10 barrels a day, after 11 years of steady pumping still yields 9 barrels a day.

Miscellaneous Production

Isolated wells have been found in the following localities, in all cases giving indications of probable commercial production but in none of the cases have proven areas been outlined sufficiently to say more than we do below: Del Bonita; Taber; Skiff—southeast of Lethbridge—1 producer; Dina near the Saskatchewan border southeast of Lloydminster; Lloydminster; Vermilion; Bragg Creek.

Medicine Hat-Redcliff

Medicine Hat-Redcliff has been producing gas since 1890, some 46 wells still supply the two municipalities with domestic and industrial fuel, forming the basis for manufacturing which includes flour milling, ceramics, glass, and greenhouse horticulture. The proven area covers at least 50 square miles, the horizon being a sandy zone in the upper Colorado.

Bow Island, discovered about 1909, was connected by pipe line to Lethbridge and Calgary in 1912, but was quickly depleted. In 1930, when large quantities of gas were being wasted in Turner Valley incidental to recovery of vapour-phase oil, the gas company installed compressors and used the pipe line to carry gas back to the field. Injection ceased in February, 1939 after injection of 13,250,000 cubic feet. The closed pressure was raised from 260 pounds to 565 pounds, and a reserve now exists as a standby in case of interruption to service.

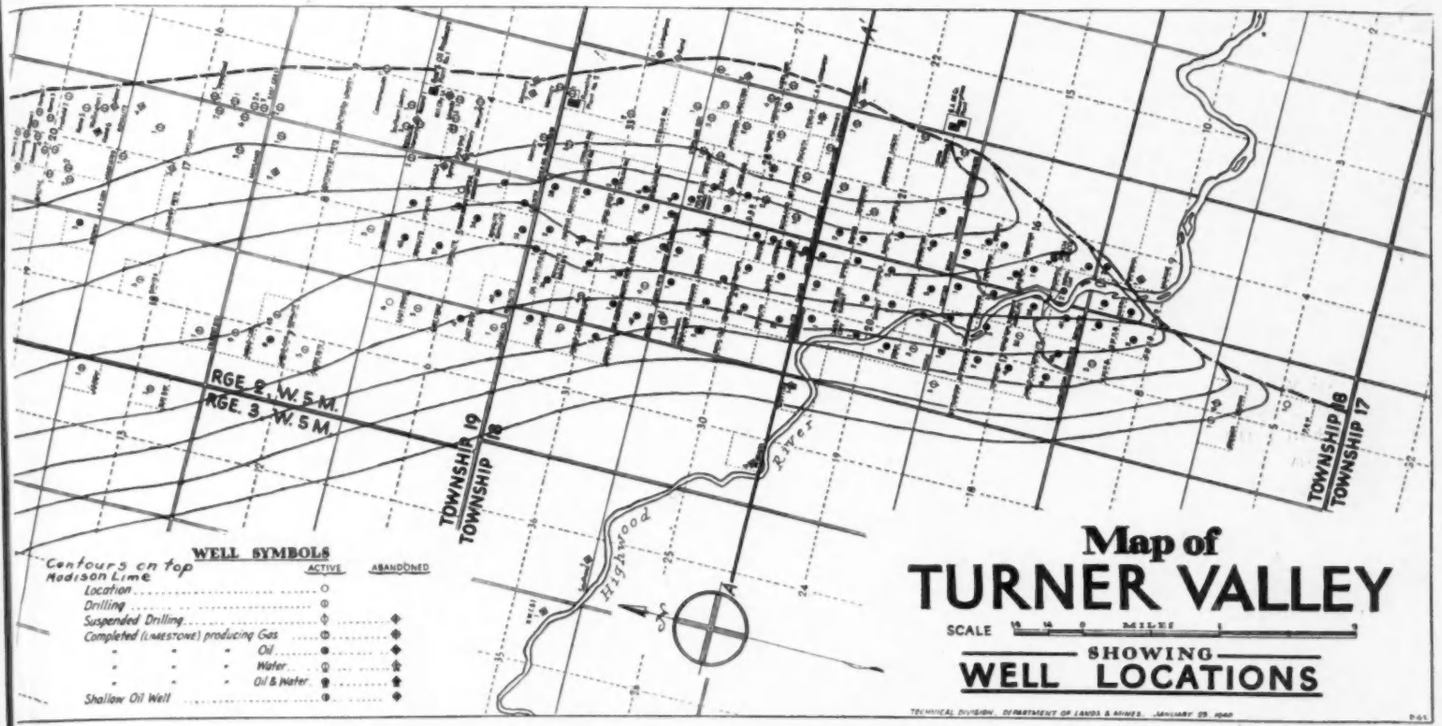
Foremost 20 miles south of the Bow Island-Lethbridge pipe line, is a small terrace structure, and is valuable as a standby.

While there are many "farm gas wells," supplying a single user, scattered over the southern part of the province, there seems to be no further proven gas field within easy reach of the Calgary-Lethbridge pipe line except Turner Valley, Bow Island and Foremost.

Steveville is about 100 miles east of Calgary and large gas flows were obtained in three wells drilled in 1939. Production is from the Madison lime contact, between 3100 and 3200 feet, where there was also a show of oil. Deepening, however, brought water and the wells were capped. Standard Oil Company of British Columbia had a test drilling

TABLE 3
Alberta Natural Gas Consumption

	Mcf.
Calgary-Lethbridge system	6,266,133
Imperial Refinery, Calgary	1,265,964
Bow Island town	45,149
Turner Valley field demand	9,161,220
Edmonton system	3,404,550
Wainwright, including estimated field use	116,531
Brooks	49,019
Medicine Hat-Redcliff	2,596,192
Exported to Montana	131,194
Red Coulee field use (including export)	33,203
Miscellaneous	52,650
Total	23,121,805



below 5300 feet on this structure in early March. It topped Madison lime at 3202 feet, had a heavy gas flow in the top 50 feet of Madison and passed through several oil shows. It is being taken down to 7000 feet for a test of the Devonian.

Further north, Viking field has supplied Edmonton with gas since 1923, and appears to contain reserves adequate to meet the demand for some years to come. The producing Viking sand is a member of the Alberta (Colorado) shale, some 100 feet above the base of the formation. An area of 15 or 18 square miles has been proven in the field. Ten miles east, the Kinsella field has been outlined by three wells. The closed pressure is analogous to that initially found in Viking field, the horizon producing gas is the same, and there is good reason to believe that the reserves of gas in Kinsella are much greater than those originally existing at Viking. Kinsella has not yet been drawn on, but it is possible it will be connected up to transmission lines before Viking is entirely depleted.

Details of Alberta natural gas consumption during 1939 are given in Table 3.

Outlying Wildcats

Many wildcat structures were undergoing test, with the possibility that one or more may be added to Alberta crude fields during the year.

At Brazeau, 100 miles northwest of Calgary, Home Oil Company was changing from cable to rotary at 6665 feet on its prospect located on 78,333 acres along a 35-mile front. The wildcat, which was forced to drop cable tools because

British Columbia Government Launches Independent Exploration Program

BRITISH Columbia's entry into petroleum exploration came at the instigation of Premier T. D. Pattullo. Field work in the Peace River district was done as early as 1919, but it was not until 1938 that the government decided to re-examine the area with a definite view of testing one or more structures. The premier, as Minister of Lands for the province, in 1918 caused to be reserved to the crown all oil and coal rights not already alienated in the area.

Early work in the Peace River area outlined a region of complex folding that, while it might be oil-bearing, offered too many problems for preliminary drilling. Immediately to the east of this area were outlined more simple structures, and still farther to the east are relatively flat structures of the Great Plains region.

The British Columbia government describes the area, where flat-lying formations of the Great Plains area merge into the highly folded and contorted formations of the Rocky Mountains, as offering favorable structures for oil exploration in the simple, well-defined structures found next to the flat-lying ones. Such structures are found at Hudson Hope, Moberly Lake, and where Commotion Creek joins Pine River. A few miles west are more complex structures resembling Alberta's Turner Valley, while to the east are flat-lying structures not considered sufficiently well defined to warrant preliminary testing in a new field, according to government authorities.

The structure at Commotion Creek and Pine River has been selected as the most favorable. It is well-defined, about 4 miles in breadth and 10 miles in length. It has been more deeply eroded than either the Moberly Lake or the Hudson Hope structures. The top of the Paleozoic, known to be petroliferous, is expected at about 6600 feet, or about 1000 feet shallower than on the other two structures.

The Commotion Creek structure is 85 miles west of Hudson Hope. A motor road extends 50 miles from Hudson Hope to East Pine. A truck road is being built from East Pine crossing to Commotion Creek. Equipment was being taken over a wagon road during the winter, making the Pine Creek crossing over the ice. A cable ferry is to be placed in operation at Pine crossing when the ice leaves.

Contract for the test, which should be drilled to completion this year, has been let to J. F. Chandler.

of heavy gas flow, expects the Madison lime at 8000 feet.

At Clearwater, 85 miles northwest of Calgary, a 2-inch diamond drill test of Calgary Gas Company and Canyon Oils, Ltd., drilled to 3052 feet or 2795 feet in the Devonian and passed through several thick zones showing good saturation of 37-gravity crude along with considerable gas. Further development will take place this year.

At Grease Creek, 40 miles northwest of Calgary, a joint test of The Northwest Company and Grease Creek Petroleums, Ltd. was shut down at 7017 feet for the winter in the Lower Blairmore. Good oil and gas showings have been reported, and the Madison is expected in a few hundred feet.

At Moose Dome, 35 miles south and west of Calgary, test of Moose Oils, Ltd., was completed at 1725 feet in Devonian where it was obtaining some production of 48-gravity oil. The test is to be deepened this year, and several other companies are reported planning tests on the structure.

At Sheppard Creek, 12 miles south of Turner Valley, joint test of Alberta Pacific Consolidated Oils, Ltd., and McDougall Segur Exploration Company, was standing at 4331 feet in early March. Oil and gas showings have been reported, and the wildcat expects the Madison lime around 4500 feet.

At Waite Valley, adjoining North Turner Valley on the west, National Petroleum Corporation's test, on a 11,500-acre block, was drilling in the Kootenay at 6940 feet early this month. It was logging favorably with North Turner Valley tests, expecting the Madison momentarily. Vulcan Oils, Ltd., holds about one-sixth interest in the well and acreage.

At Whiskey Creek, a north offshoot of Waite Valley, Mar Jon Oil Company's test was shut down for the winter at 2270 feet in the Bentons. The Madison is expected between 4500 and 5000 feet.

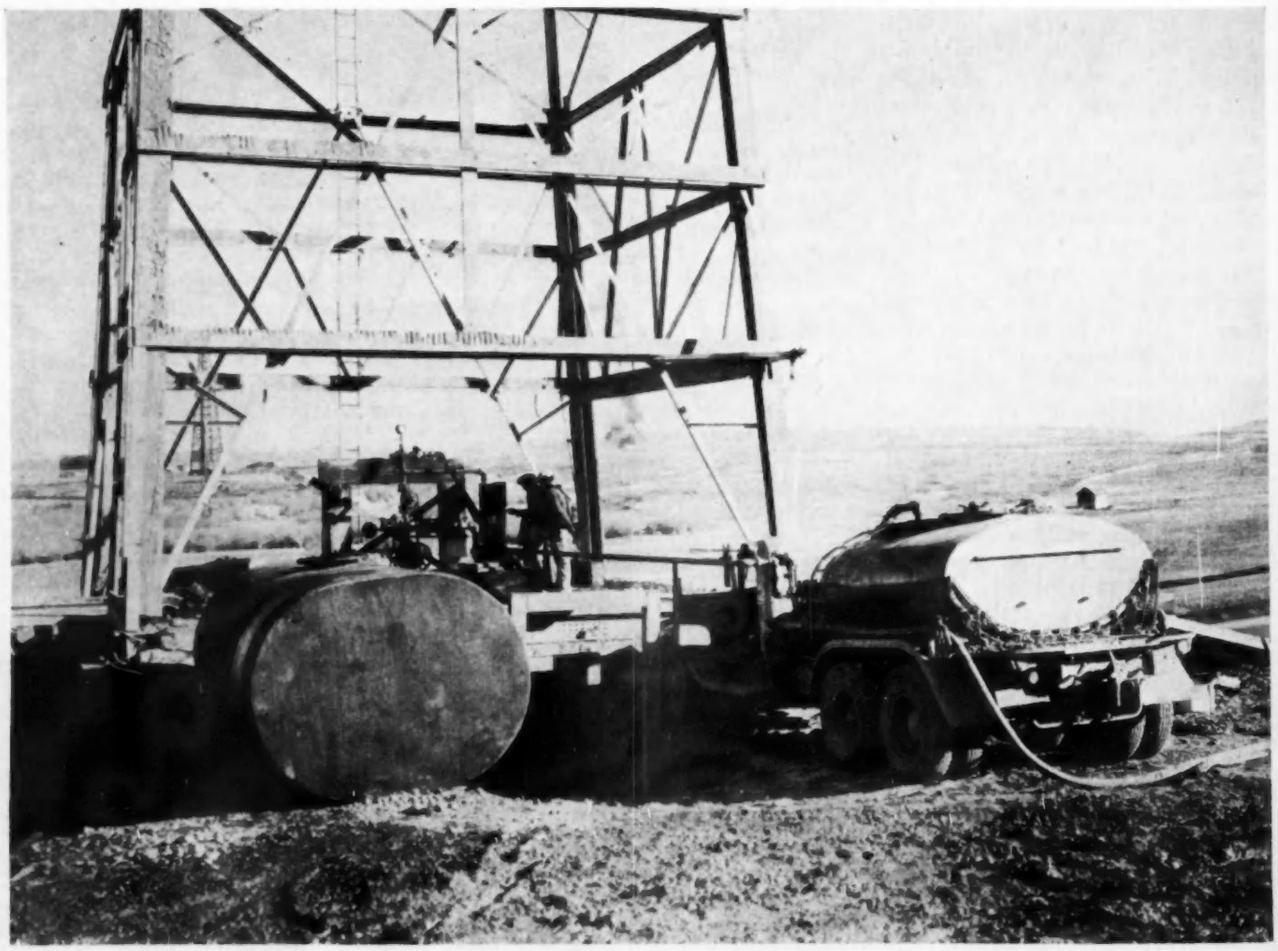
On the Alberta portion of the Peace River structure, previously mentioned as being subject to test by the British Columbia government, Benedum & Trees' wildcat test was shutdown for the winter at the top of Devonian at 5500 feet.

Other Wildcats

Among other Albertan wildcats, Brown Consolidated Oil Company's No. 1, a test drilled to 6885 feet on Jumping Pound structure, 22 miles west of Calgary, gave rise to the theory that the anticline is a drag fold above a major fault and, according to G. S. Hume, Department of Mines and Resources, Ottawa, apparently has resulted from a thrust by a major mass of limestone farther west. This information, Hume observes, may be valuable in future exploration.

Nothing of commercial importance developed from drilling on Savannah Creek, 25 miles southwest of the south end of Turner Valley. The same was true of the Ram River project 110 miles northwest of Calgary.

Seismic surveys on Blood Indian Reserve, southwest of Lethbridge, point to a structure with considerable closure on the north plunging Sweet Grass Arch. It will be tested during 1940.



Acidizing a Turner Valley Well —Photo by H. Pollard, Calgary

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Saskatchewan Activity Featured By Exploratory Efforts

By E. SWAIN, Supervisor of Mines, Province of Saskatchewan

WHILE no new fields were drilled to production in Saskatchwan during 1939, appreciable progress was made in exploring the possibilities of the active sections in the province. This included deep drilling, geological examination and shallow structural test well work. In addition one private company undertook a geo-electrical examination using a resistivity method of ascertaining structure in sections which hitherto had not been gone over. This program has not been completed and will be continued during 1940.

The Lloydminster area was enlarged both in respect to its gas and oil possibilities by the addition of three new oil wells and one natural gas well. The present situation is that of the 11 producing wells—4 have encountered oil, being the Colony No. 3, Shaw Petroleum Company's Nos. 2 and 3 and Lloydminster Royalties Company's No. 1. Six wells are natural gas producers, being Lloydminster Nos. 3 and 4, Colony Nos. 1 and 2, Triangle No. 1 and Shaw No. 1 Triangle No. 2 is not completed.

In addition to these Franco Triangle No. 3 has been commenced and location chosen for Shaw No. 4 and Lloydminster No. 1, the last two being across the line in Alberta. Of the above producing wells Lloydminster Royalties No. 1 and Shaw Nos. 1 and 2 are in Alberta.

The oil so far encountered has been found in the Lower Cretaceous formation, being of heavy type and arrangements have been made to supply Saskatchewan Power Commission with 100 barrels of fuel oil daily. A refinery has been arranged for to produce high-octane gasoline and commercial alcohol with a daily output of 20,000 gallons. This plant will cost about $50,000 and is to be completed by April 1st, 1940.

No effort has so far been made to test the possibilities of the limestone which immediately underlies the present producing formation.

An attempt is being made to find other markets for the surplus natural gas which so far has served the town of Lloydminster only. There are 413 metered connections in the town which consumed 94,061,000 cubic feet during the calendar year, as against 90,288,000 cubic feet of the previous year.

No further drilling was undertaken near Vera, where an estimated 50-barrel oil well was discovered in 1938, but as this well is in poor condition it will be plugged and a new well drilled. Additional geological work was performed, resulting in the site of the new well being chosen.

To Resume at Simpson

At Simpson the No. 2 deep test resumed drilling after a period of inactivity due to loss of the derrick and some equipment by fire. After some trouble in shooting and sidetracking frozen casing the well is now in a condition to make normal hole. Numerous showings of gas and oil have been encountered to its present depth of about 2500 feet, being in the upper part of the Lower Cretaceous formation.

Kamsack area was again subjected to further research, four shallow test wells having been completed to a Key horizon, one of which is a gas well at 216 feet. Near the town a deep test was carried to 1390 feet, where drilling stopped for the winter. Another deep test recently commenced two miles south of the town has reached 265 feet.

Small scale operations were resumed at Riverhurst where a small bore deep test is being attempted—it has now reached 1112 feet. A geological examination was also undertaken in this area.

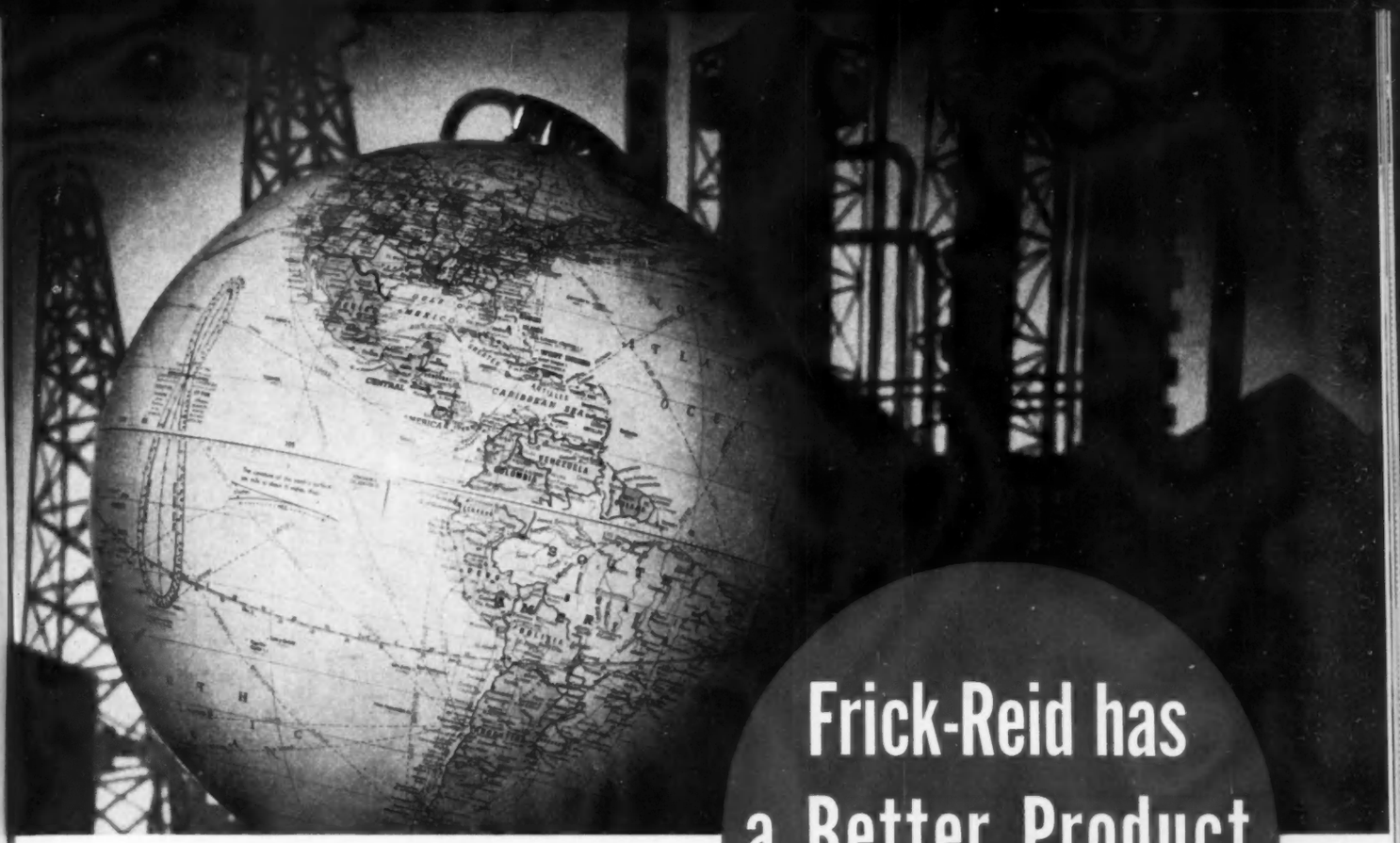
At Maple Creek little progress was made in Western Royalties' No. 1, although arrangements are being made to carry the well to greater depth in 1940. It now stands at 2540 feet.

Some shallow well test drilling was commenced in the vicinity of Neudorf, where a series of such wells will be sunk.

Although activity was not pronounced during the first eight months of the year there has since developed a decided improvement in interest to prospect for oil and gas in the province.

Fishing tools weighing 3,000 pounds were blown from a depth of 6,600 feet when Home Oil Company's Brazeau 1 test blew out.

—Photo by Home Oil Company



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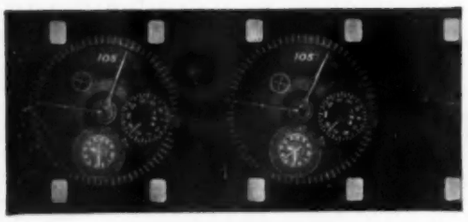

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POLAR CORE ORIENTATION SAMPLE CORE

K-K WHIPSTOCK AND REMOVAL SUB

MAGNETIC DEFLECTING TOOL ORIENTATION

They are all self-checking. That's the most important requirement for any well surveying instrument. Sperry-Sun instruments will produce a record only after the recording devices in the instrument have completely come to rest at the depth at which the information is wanted.

An instrument which can produce an easily readable record without any assurance that its recording device is at rest, cannot guarantee accurate results, thus defeating the purpose of the survey, resulting in loss of time and money for the driller.

With the Sperry-Sun instruments, you are always sure of a true and accurate record. Get the advantage of this self-checking feature. It's standard throughout the Sperry-Sun line, from the SURWEL Gyroscopic Multiple Shot Clinograph to the SYFO, H-K Single Shot, and H-K Inclinometer.

SPERRY-SUN WELL SURVEYING CO., 1608 WALNUT ST., PHILA., PA.

HOUSTON, TEX. • CORPUS CHRISTI, TEX. • SEAGRAVES, TEX. • LONG BEACH, CALIF.
BAKERSFIELD, CALIF. • LAFAYETTE, LA. • TULSA, OKLA.

Tests in Alaska Reveal Deep Possibilities

"A Quiet Summer Evening" on Alaska's Chinitna Peninsula prospect, where further drilling has been temporarily blocked.

INISKIN DRILLING COMPANY, which has been endeavoring to establish commercial production for several years in the Chinitna Peninsula region of Alaska, will not be able to continue efforts in 1940 unless the United States congress and senate take favorable action on a bill introduced by Senator Hiram Johnson of California providing for extension of certain types of public land prospecting permits. The bill has been read twice in the senate and referred to the committee on public lands and surveys.

R. E. Havenstrite, president of the drilling company, writes: "We have received information that the Geological Survey of the Department of Interior has refused to accept our showing of a valuable discovery on our well in Alaska as a basis for continuing the life of our titles to the property, and if this cannot be overcome, it is apparent that our efforts have been in vain as this completely kills title which we hold to the land."

Because the Chinitna Bay and Peninsula present a virgin region so far as petroleum exploratory efforts are concerned, something of the history of its only relatively deep wildcat will be of value for future reference.

After having shut down for the winter of 1938, drilling was resumed at 7156 feet May 29, 1939, and continued without incident for 1000 feet. Several thin bodies of oil sand were encountered in this 1000 feet, the most important being found around 7900 feet. This was the sand that encouraged the company in the belief that the bit was approaching an oil bearing sand zone. However, at the 7900-foot level the formation became exceedingly difficult to drill.

Progress was very slow down to 8500 feet, where it softened up enough to allow progress of 25 feet per day, the formation containing 10 to 12 percent siltstone showing considerable oil cut under acetone test. Oil and gas showings continued strong in the drilling mud.

At 8734 feet six feet of salt water sand, which could not be shut off owing to lack of supplies, was hit. At 8775 feet, mud, fuel and other supplies were exhausted. While preparations for an open hole test were being made at this point, the well started flowing of its own accord, but the flow changed to salt water, accompanied by considerable gas and a very small amount of high gravity oil, described by Havenstrite as being practically pure gasoline. Closed in, the well built up a pressure of 2000 pounds.

Havenstrite sums up his company's seven years of effort on Chinitna Peninsula as follows:

"Oil and gas are present in practically all of the formations from 4600 to 8775 feet.

"The well is on top of the dome.

"Stratification of the formation at the bottom of the hole is very uniform and shows only two to five degrees dip.

"The shale body is a great deal thicker than was indicated by any of the geological information available.

"We have not yet reached the zone which was expected to be productive and which would appear in the lower section of this shale body."

G. C. Killingsworth, petroleum engineer and geologist who spent considerable time at Iniskin Drilling Company's Alaskan wildcat during 1939, reported that the well was located in a favorable structural position on an anticline. He said there was a fault shear zone approximately 300 feet thick which

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad

GUIBERSON SWABS

Patented

Type "K"

The GUIBERSON flexible-basket type swab was the first (and still is the only) swab which utilizes the correct swabbing principle. In running in, the fluid compresses the flexible cup inward, thus insuring speed in lowering and preventing wear. In coming out, the fluid weight expands the flexible cup outward to give perfect, constant contact, thus insuring full recovery.

Advantages: **1. Runs in faster; 2. Raises full load; 3. Cups yield to pass projections and paraffin—will not stick; 4. Special composition cups protected by steel wires last longer; 5. Less wear on tubing and casing; 6. Cups changed more speedily; 7. Same cup will fit slightly varying diameters of tubing and casing.**

Type "A"

SUCKER ROD STRIPPER

Patent Pending

The GUIBERSON perfected Sucker Rod Stripper provides a positive seal against escape of oil and gas, when running in or pulling rods. Strips paraffin as well as oil from rods and couplings. Specially developed rubbers are long-lived. Two sizes of rubbers handle all sizes of rods.

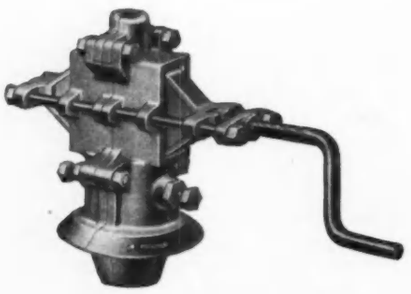
DRILLING HEADS

Patent Pending

The present trend in completion of wells by drilling-in-under-controlled-pressure, and recent developments in reverse circulation, have created a definite need for an efficient, compact rotating pack-off. To meet this requirement the GUIBERSON Drilling Head was designed. It is compact, has the rotating feature, and will provide a positive pack-off between the casing and the kelly, drill pipe or tubing. Definite protection is assured when drilling-in-under-controlled pressure, running tubing under pressure, or cleaning out well by reverse circulation.

The packing medium rotates with the kelly, thus eliminating wear on packing when drilling.

These drilling heads are manufactured in sizes to take from 2″ tubing up to 6⅝″ drill pipe with tool joints. Test pressures up to 6,000 lbs.



WIRE LINE OIL SAVER

Patented

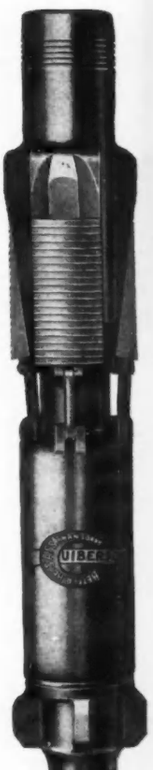
The GUIBERSON Wire Line Oil Saver is the outstanding device of its kind. Its patented method of adjusting both rubbers simultaneously and uniformly by turning one crank insures equalized pressure and uniform wear on rubbers. 500 pounds test. Easiest to operate. Perfected in every detail.

TUBING CATCHERS

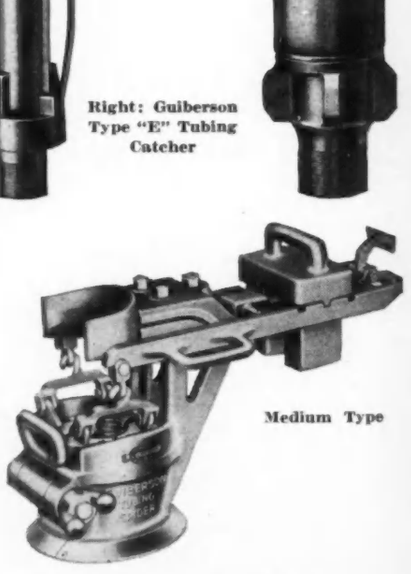
Patented

GUIBERSON introduced the automatic tubing catcher, and offers the world's most complete line. Type E is for wells of any depth —Type B for wells under 4,000 feet — Type C for wells with faulty or thin casing. A few advantages: 1. Slips of ample size operate accurately on dovetail tracks; 2. Load-carrying parts are heat-treated alloy steel; 3. Special non-fatiguing spring; 4. Large by-pass area. In pumping we recommend use of GUIBERSON Tubing Catcher Anchor with catcher, for increased efficiency.

Left: Guiberson Tubing Catcher Anchor



Right: Guiberson Type "E" Tubing Catcher



Medium Type

TUBING SPIDERS

Patented

The GUIBERSON Tubing Spider offers two outstanding advantages over others, in its new patented Guide Head, and its arrangement for controlling slips with one lever. The adjustable Guide Head guides tubing to exact center of bore, causing slips to seat accurately. Operator then controls slips by means of the lever. Weight can be set so slips ride tubing when coming out, and automatically grip it if it falls—or so slips retract when tubing is lifted. Heavy type handles 2″ to 4″ tubing in any depth well. Medium type handles 2″ to 3″ tubing and will support 5000 feet of 3″ upset tubing.

For Further Details See the Composite Catalog

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad

SPIRAL PACKERS

Patented

GUIBERSON Spiral Tubing and Casing Packers are the only formation packers which do not rely on friction. Steel spirals expand and bite into walls of well when collapsed, and the oakum packing medium packs off any deformity.

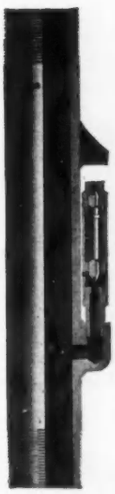
SPIRAL PLUGS

Patented

The GUIBERSON Spiral Bottom Water Plug has had unique success because its spirals expand laterally and take a screw-like bite in the walls of the well. Oakum is used as packing. Three types: Standard, for setting a few feet off bottom; Collapsible Core, for setting directly against bottom; Wash-Down Type, through which water may be circulated.

NEW TYPE FLOW VALVE FOR GAS LIFT

Patent Pending



The New Type GUIBERSON Flow Valve at last provides the valve that gas-lift men have been awaiting. This valve is operated exclusively by differential pressures both in opening and in closing. Its positive action is achieved by means of a double-action piston valve stem, the piston being effective at only one end at a time. Velocity of fluid has no effect of any kind on this valve. It opens only when the head of oil is heavy enough to overcome the predetermined differential and it promptly closes after the gas has lifted and removed the head of oil, allowing the oil to build up a new head.

All guess work incident to the use of older types of gas or air lift valves is eliminated by the simplicity and positive functioning of the Guiberson New Type Valve. Each valve is tested on the factory's special test block and is guaranteed to perform successfully in the well for which it is recommended.

To carry wells to depletion we also offer the new GUIBERSON surface-controlled Intermitter.

Our customers have access to our authentic production records (company names omitted), and are invited to write us stating their gas lift problems. Complete recommendations will be gladly submitted by our gas-lift engineers.

Type C-1 — Type G-2 — Type GT

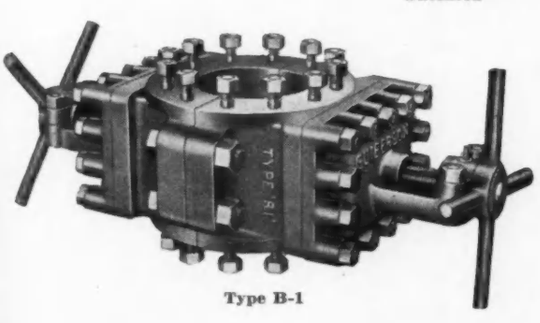
GUIBERSON CONTROL-HEAD PACKERS

Patented

GUIBERSON patented Control Head Packers possess several exclusive advantages: 1. Valve at top permits running in against heavy flows, oil and gas passing upward through packer; 2. Passage can be opened through packer at will after setting, by simply raising tubing; 3. Packer can be reset higher or lower at will; 4. No swabbing effect, coming out as valve opens; 5. Neoprene packing used with G Packers and optional with C-1 is oil resisting and will not stick. Types shown are C-1, with single rubber of graphited rubber or Neoprene; G-2 with two rubbers of Neoprene; and GT Type, similar to G-2 but with 30" valve opening. The 2-rubber packers offer a new advantage as when packer is set the backs of metal parts which hold rubbers are in contact with each other and carry the tubing. In Type GT the 30" valve opening eliminates nozzling effect, also allows valve to be opened after packer is set without changing position of packer.

DRILL PIPE AND TUBING OIL SAVERS

Patented

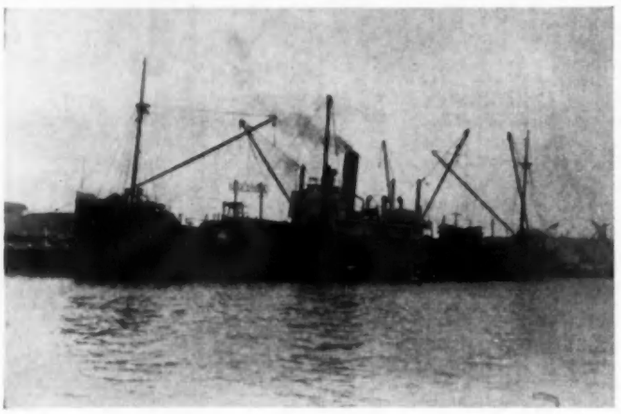


Type B-1

GUIBERSON stands alone in having perfected a complete line of Oil-Saver equipment for high-pressure wells. There is no other equipment on the market comparable to these GUIBERSON High-Pressure Drill-Pipe and Tubing Oil Savers. These savers quickly pay for themselves through making possible improved production methods and saving oil. Furthermore, by making a positive seal around drill-pipe or tubing and eliminating any loss of oil, they (1) prevent fires by keeping oil from scattering; (2) Prevent oil-soaked, slippery derrick floors which cause injuries to men. Three types are offered: B-1 for pressures up to 400 pounds; C-2 for pressures up to 600 pounds; D for pressures up to 1,500 pounds. Heavy cast steel housing of the B-1 is in two pieces for easy assembly around the pipe. Housings of the C-2 and D are of alloy cast steel in one piece for extra strength. Special rubbers of a durable, oil resisting compound permit easy passage of pipe collars and are easily changed by removing end plates. Adapters to fit any type of hook-up are available.

For Further Details See the Composite Catalog

TRANSPORTATION IS BIG PROBLEM



Iniskin Drilling Company had to buy the ocean-going "Iniskin," above, in 1936 to get material to location on the Alaskan Peninsula.

Fuel oil's route: by ship to Chinitna Bay; by tractor several miles inland through marsh and forest to location on the structure.

Wharfside unloading from the freighter was precluded by shallow waters, so the organization had to stand the added expense of lightering and barging.

caused difficult drilling conditions, but that the bottom of the hole was on the most favorable flank of the structure.

"It is my opinion," Killingsworth stated, "that the well is approximately 40 feet into a predominantly sandy phase of the Jurassic which is described in the United States Geological Survey publications as being 1128 feet thick. Until this zone is tested the area will not be proved or disproved."

About 150 miles south of the above project, Standard Oil Company of California, Union Oil Company and Tide Water Associated Oil Company are drilling a joint test in the Jutebay district. According to P. H. Patchin, director of the Standard, which is the operating company, the Jutebay wildcat recently passed 6907 feet without having encountered commercial production.

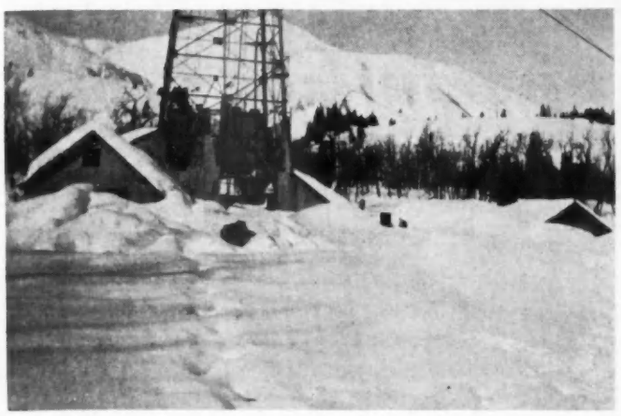
Phillip S. Smith, chief Alaskan geologist of the United States Geological Survey, has said the three Alaska regions in which the presence of petroleum has been definitely determined are Yakataga-Katalla area in southern central Alaska, the eastern part of the Alaska Peninsula from Chinitna Bay southwestward to Chignik, and near Smith Bay in extreme northern Alaska. Of these Katalla field is the only one from which commercial production has been obtained.

The Katalla area's past petroleum activities have centered around two spots. One begins three miles east of Katalla and extends 18 or 20 miles east to Mount Campbell. The other begins near Johnson Creek and about 10 miles west of Icy Bay, and extends 10 miles westward. Between the two is a gap of 50 or 60 miles, still unexplored because of extensive ice fields and forbidding physical features. Scores of seepages abound in the area.

Katalla's paraffin base oil, which has practically no sulphur, runs from 41½ to 45 degrees Beaume,

Though he may be the darling of the bunkhouse, this black bear apparently does not rate so high with one member of the Iniskin camp.

SCENIC GRANDEUR LENDS ROMANCE



"If winter comes, can spring be far behind?" It isn't in this springtime shot of Iniskin's wildcat—believe it or not.

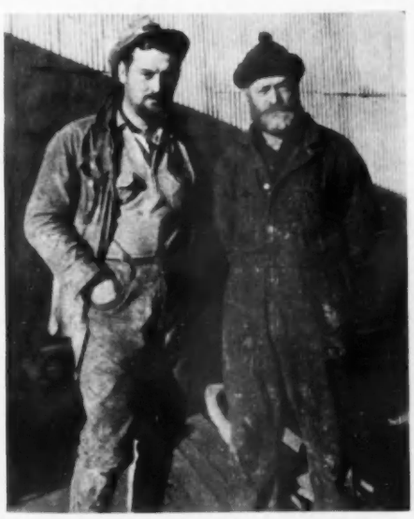
Late springtime traffic from the lower camp on the bay to the test carries the trucker along a route easy to look at.

according to G. C. Martin, government geologist who made a preliminary report on the area. It is high in naphtha and gasoline content, the recoverable content of gasoline and distillate being about 63 percent. The absence of a recognized mother rock at Katalla led Martin to suggest the likelihood that the oil had originated in older rocks now buried under the Tertiary formations that crop out at the surface. Katalla is about 50 miles airline distance from Cordova, an excellent harbor, and less than 30 miles from the tracks of the Copper River & Northwestern Railroad.

In the extreme northern part of Alaska, to the east of Point Barrow, the government has set aside 35,000 square miles as Naval Petroleum Reserve No. 4. The only actual seepages of oil seen in this large reserve occur in the vicinity of Cape Simpson about a mile inland from the Arctic Ocean. Smith believes the Upper Cretaceous in this neighborhood to be at least 10,000 feet thick. Sidney Paige, who with others made a reconnaissance of the region prior to 1925, said, after analyzing some of the Cape Simpson seepage oil, "The tests indicate lubricant values in the weathered oil which, in fact, appears comparable in Beaume gravity, sulphur content, viscosity and distillations tests to the oil obtained from the shallow wells in the Pliocene rocks in the Blue Ridge field of Texas."

With Cape Simpson inaccessible except by plane for 10 months of the year, it is safe to predict it will be many years before exploitation of United States Naval Reserve No. 4. But there is a distinct possibility that Southern Alaska, that region being prospected by three major West Coast organizations and Iniskin Drilling Company, may enter the ranks of producers before the close of 1941. At least a basis for correlation will be provided, for outside of a 5000-foot Pearl Bay test drilled some years ago, 1939 afforded the region with its first relatively deep logs.

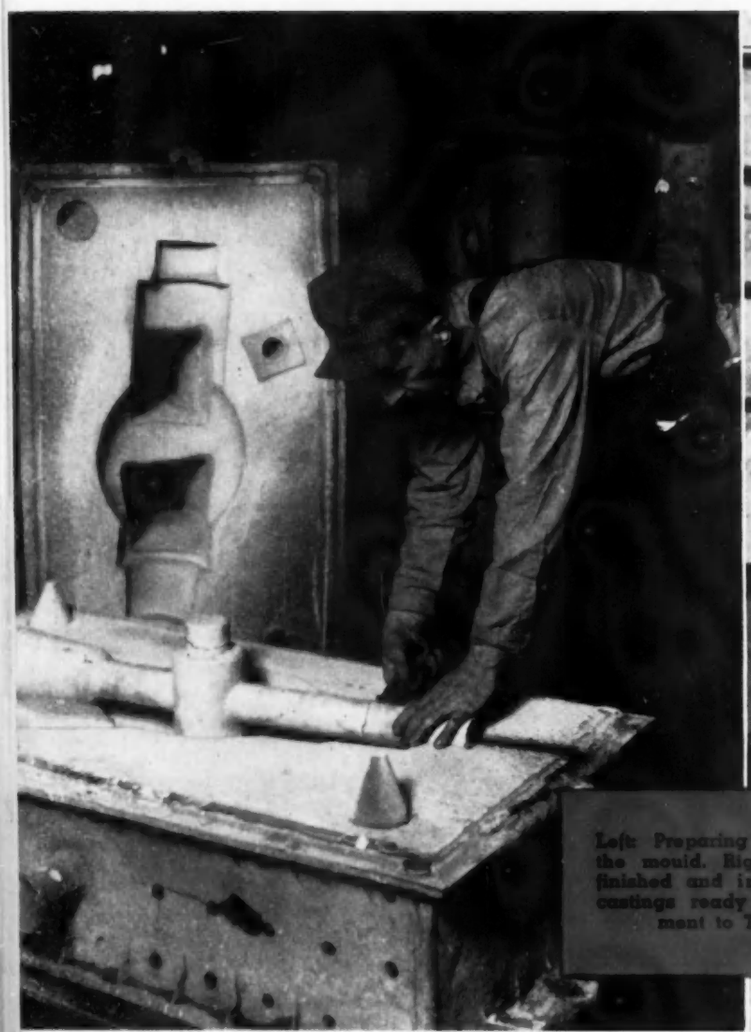
Chinook thaws were just about over when Homer Havenstrite, general superintendent and geologist for Iniskin Drilling Company in Alaska, posed for this shot.



Not with Byrd in Little America. Just Ed McWhirter and F. M. Anderson, California drillers strayed to an Alaskan wildcat.

OUR FIELD IS THE OIL FIELD

And the TIW Grief Stem Safety Valve Is an Example of Our Specialized Work



Left: Preparing to close the mould. Right: Three finished and inspected castings ready for shipment to TIW.

This widely used safety tool has an important job from the minute drilling starts . . . tougher and more important as the hole goes down. It's when the bit starts tapping gas formations, though, that it really goes "on the spot" . . . because this Grief Stem Safety Valve, a product of Texas Iron Works, prevents wells from blowing out through the drill stem. The design is a unique one, but it takes more than just a design, well developed, to carry on here. This tool must also do the job of a joint of drill stem too, and holding a 180,000-pound drilling string, for example, calls for quality steel. That's where we come in . . . to make a casting of proper alloy steel, properly heat treated, to stand all and more than is asked for in this most important piece of equipment.

TEXAS ELECTRIC STEEL CASTING COMPANY

HOUSTON, TEXAS

Largest Producer of Alloy Steel Castings for the Oil Industry

Inset: Machining operation in TIW Shop. Left: Supporting 11,650' string of 4" drill pipe.

New Treasure From the Indies

HISPANIOLA, a name recalling romantic adventures of days of the Spanish main, when wealth of the New World was expressed in terms of spices from the Indies and gold and silver from the Andes and Mexico, looms on the horizon 300 years later as the potential source of another type of great wealth.

For the Antilles seem to be coming into their own again. This time the magnet drawing men and money to the islands is oil. Cuba entered the year under the surge of the greatest drilling campaign in its history. The Dominican Republic, which comprises the eastern end of Hispaniola, in 1939 made its debut as a new oil producer through completion of two wells at about 580 feet capable of producing 300 barrels of 21 gravity, Beaume, oil per day.

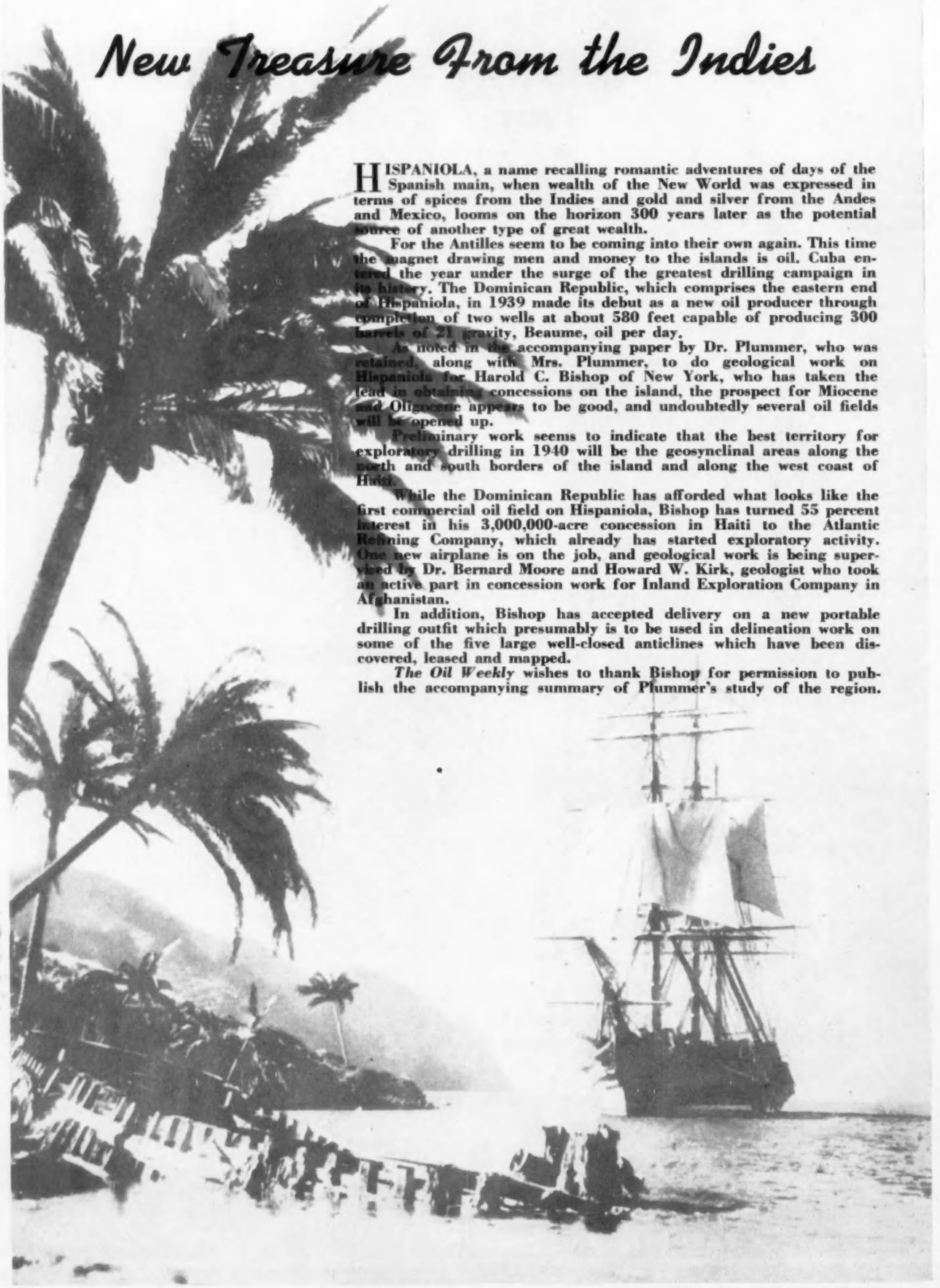
As noted in the accompanying paper by Dr. Plummer, who was retained, along with Mrs. Plummer, to do geological work on Hispaniola for Harold C. Bishop of New York, who has taken the lead in obtaining concessions on the island, the prospect for Miocene and Oligocene appears to be good, and undoubtedly several oil fields will be opened up.

Preliminary work seems to indicate that the best territory for exploratory drilling in 1940 will be the geosynclinal areas along the north and south borders of the island and along the west coast of Haiti.

While the Dominican Republic has afforded what looks like the first commercial oil field on Hispaniola, Bishop has turned 55 percent interest in his 3,000,000-acre concession in Haiti to the Atlantic Refining Company, which already has started exploratory activity. One new airplane is on the job, and geological work is being supervised by Dr. Bernard Moore and Howard W. Kirk, geologist who took an active part in concession work for Inland Exploration Company in Afghanistan.

In addition, Bishop has accepted delivery on a new portable drilling outfit which presumably is to be used in delineation work on some of the five large well-closed anticlines which have been discovered, leased and mapped.

The Oil Weekly wishes to thank Bishop for permission to publish the accompanying summary of Plummer's study of the region.



Hispaniola . . . a New Oil Province

By F. B. PLUMMER, Geologist, University of Texas

DOMINICAN REPUBLIC occupies the east three fourths of the island of Hispaniola in the Antillian chain of islands which extend in a long arc from Cuba to Venezuela. Hispaniola is situated midway between Cuba and Porto Rico near the middle of the chain. It is the widest island in the group and next to the largest. Haiti makes up the western section of Hispaniola.

By the Pan American Clipper from Miami, Florida, to San Pedro, Dominican Republic, is about 1000 miles, and the time required by airplane is about 8 hours. The route south from Florida to Dominican Republic is along the north coast of Cuba to Antilla, located on the north coast of Cuba; thence to Port au Prince, Haiti, and from Port au Prince across Haiti to San Pedro on the south coast of the Dominican Republic.

Description of Hispaniola

The island of Hispaniola in size compares roughly to the east half of Texas. Its total area covers 28,000 square miles. Its greatest length is 407 miles and greatest width 160 miles. It is a very mountainous country made up of 3 principal rugged chains which run from west to east across the island and are separated by narrow valleys and set off from the sea by narrow coastal plains. In fact, the name *Haiti*, designating the western end, means mountainous. The climate is about like South Texas in the early fall. The temperature ranges between 80 and 90, and, except on the high mountains, no frosts occur. Rainfall is plentiful along the

eastern and northeastern sides of the island and scarce on the southwestern portion. Consequently the eastern half of the island is covered by a luxuriant vegetation like that of the east section of the Texas Gulf Coast. The western half, on the other hand, has a cactus, thorny brush cover more like Southwest Texas. The population of Dominican Republic is about 1,500,000, and that of the Republic of Haiti is about 3,500,000. Thus the smallest political division has much the denser population.

History

Columbus landed in Hispaniola, December 6, 1492, and established the first colony at the mouth of the Ozama River on the south side of the island. When the Spaniards arrived on the island there were said to be about 2 million native Indians. The Indians were killed or died off, and negroes were imported from Africa to till the land and work the sugar plantations. Sugar was introduced in 1506. In 1630 a mixed colony of French and English settled in the western half of the island, and in 1697 by the treaty of Ryswick the western part of the island was ceded by Spain to France under the name of Saint Dominique. In 1791 the plantation slaves broke out in insurrection and lawlessness reigned until 1801 when an accomplished negro and military genius took over and established order and became governor. In 1803 the French gave up the struggle against the blacks and evacuated the island, and the original name of Haiti was restored to the western province. Meantime the eastern part of the island remained under Spanish rule until 1844. In 1844 the Republic of Santo Domingo was established and from that time on two political divisions have remained: Haiti on the west and Santo Domingo, now called Dominican Republic, on the east.

In Haiti French, or a corrupt French, is the national language, and in Dominican Republic Spanish is spoken. Ninety percent of the natives are negroes, or near negroes, and 10 percent whites of Spanish descent. The political history of both nations, since their freedom from France and Spain was gained, has been one continuous struggle between excitable natives and overbearing governments. Finally about 1920 lawlessness became so rampant and the governments fell so deeply in debt to France, that the French threatened to step in and take over the customs. The United States, with its interests in Cuba on one side and in Porto Rico on the other, needed to have this neighbor more peaceful. Accordingly the American government sent the marines to the island, and without much opposition they took over both governments and occupied the island from about 1919 to 1927, established peace, cleaned up the towns, and trained natives to police the country and to maintain order. The marines took over the customs and payed off debts and clothed the native army with American uniforms, so that today the country looks like an American colony or American protectorate. Although it is run entirely independently, American currency is used in the Dominican Republic.

Tucked away in the verdant hills of Azua Province, Dominican Seaboard's Quita Corriza 1 was spudded October 26, 1939.

The country is governed by Trujillo, a former sergeant trained by American marines. He, like most dictators, has ruled strictly, but in spite of this he is well liked, has the army backing, maintains order, and the people enjoy a peaceful prosperous existence in a really beautiful land. The chief industry of the island is agriculture. The largest crop is sugar cane, next come coconuts, tobacco, coffee, and bananas. The natural resources are almost undeveloped.

Geology

The regional geology of Hispaniola is similar to that of Cuba and Porto Rico. The strata are highly folded and compressed into east-west trending mountain ranges, with deep intervening valleys. Three principal ranges of mountains are recognized, the Cordillera Central, made up of metamorphic and igneous rocks which form the backbone of the island, the Cordillera Septentrional trending along the north coast and consisting mostly of highly tilted and elevated tertiary rocks, and Sierra de Barohuca made up of igneous and sedimentary rocks along the south coast.

Cretaceous strata are very badly contorted, altered, and metamorphosed especially where they come in contact with the igneous rocks. They consist of shales, slates, schists, and serpentines.

Eocene sediments are made up of a thick section of limestone and some shale. The limestone is white, hard, massive, and contains Nummulites and orbitoids, but large fossils are rare. Its thickness is reported to be 1000 to 3000 feet. It forms high steep hog-back ridges paralleling the igneous ridges and is called the Mountain limestone.

Oligocene strata overlie the Eocene limestone. The Oligocene rocks have been named *Tabera* group. The beds consist of three divisions:

1. At the top, a massive, poor-

IT'S RED-REX QUICK JOINT PIPE UNIONS 100%

ON NEW RIGS TODAY, many operators are specifying that *all* unions be RED-REX Quick Joint Pipe Unions. This demand for "RED-REX 100%" by the firing-line buyers is the logical result of a product so designed and so constructed that it fills every drilling need.

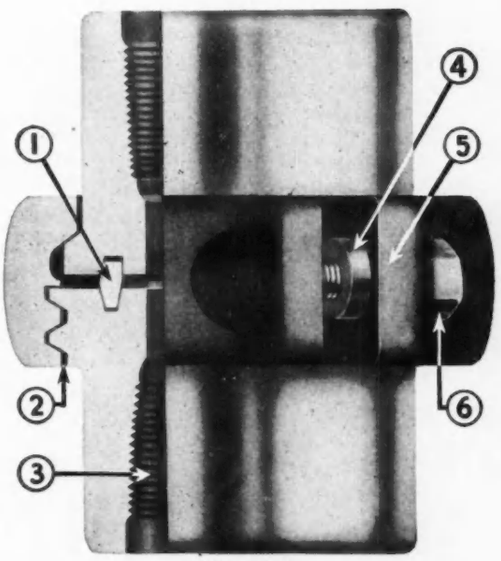
Red-Rex
HIGH PRESSURE STEEL UNIONS

IN GAS RE-CYCLING PLANTS, where leaks can't be tolerated, and where pressures are important, it's RED-REX again. The patented seal ring, with its three tapered sides, guarantees an absolutely leak-proof seal. And the tested pressure ratings give positive assurance of safety. That's why it's "RED-REX 100%."

1.—SEAL RING AN EXCLUSIVE FEATURE . . . Three tapered sides provide leak-proof seal under high temperatures and pressures; one straight side wedges ring tightly into hub . . . it can't fall out.

2.—TAKES CARE OF EXPANSION . . . Loose Threads between draw collar and hub allow for contraction and expansion and permit misaligned hubs to be drawn together.

3.—PERFECT THREADS . . . Every Red-Rex Pipe Union is tapped with lead screw engaged to insure close tolerances on leads.



Patented

4.—IT WON'T STICK . . . A few left turns on the screw and the collar spins off. Corrosion won't stick it.

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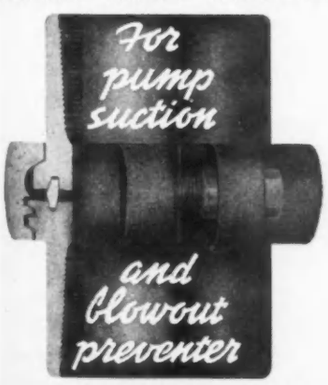

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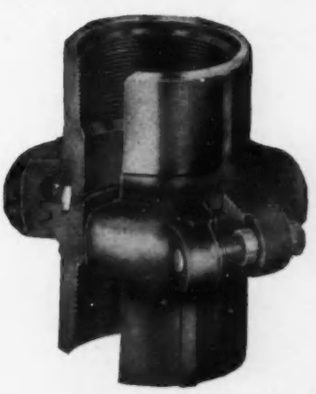

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ly bedded, white hard limestone with some pebbles and conglomerate at its base and containing corals, *Lepidoclicina*, and other orbitoids. The total thickness is about 200 feet.

2. In the middle a massive, coarse, cross-bedded alluvial fan-like conglomerate grading into cross-bedded sand toward the coast line. The pebbles range in size from a fraction of an inch to several inches. Most of the material is of igneous origin, but near the base some of the pebbles are derived from the Eocene limestone. Its thickness ranges from 50 to 450 feet.

3. At the bottom a thin-bedded black carbonaceous shale resembling the Eagleford shale and having the appearance of a good source bed. Its total thickness is 250 feet.

The Miocene strata have been designated the *Yaque* group. These beds also consist of three members as follows:

1. Upper Yaque marl containing layers of sand and conglomerate near the top and having total thickness of nearly 2000 feet.

2. A middle fossiliferous limestone rich in fossils, especially corals, and called the coralline limestone.

3. Lower Yaque marl containing layers and lentils of sand. The marl is thin-bedded, black, and petroliferous and apparently is a good source rock. It is thought that the oil now being produced comes from this part of the section. The thickness of this member is about 600 feet.

The Recent strata, which overlie the Miocene beds, consist of two formations: a coarse unconsolidate gravel bed and a massive reef limestone forming today all along the coast line. The gravel is termed *Las Matas* formation. It ranges from a few feet to 200. It is distributed all along the coast and merges inland with the high terrace gravels somewhat like the Reynosa formation of Texas.

The limestone is a massive coral reef limestone just like the limestone forming along the coast today. It overlies the gravel and in places has been elevated by recent uplift to 200 or 300 feet above sea level. Its outcrop, however, is confined to the coast line.

Structure

Regional structure of the island consists of east-west trending ranges, with inter-mountain geosynclinal valleys. The oil structures occur in the geosynclinal valleys and in most places are long narrow anticlines with steep dips and large closure. Numerous faults occur, both of the normal and thrust type.

At least 5 large well-closed anticlines have been discovered, leased, and mapped as follows:

1. Melano located 13 miles northwest of Azua.

2. El Higuerito located 18 miles northwest of Azua.

3. Quita Corriza located 30 miles west of Azua.

4. Canoa located 30 miles southwest of Azua.

5. Monte Cristi located 75 miles west of Puerto Plata.

All, with the exception of Canoa, are large elongate anticlines with steeply dipping sides and pronounced closure. Canoa is an elongate dome, developed on a large plunging anticlinal ridge.

Practically all the drilling to date has taken place on the El Higuerito structure near an oil seepage where at least 5 tests have been drilled by Inter-Ocean and other oil companies; and at Maleno, where 3 holes have been put down, one by The Texas Company and two by Dominican Seaboard Oil Corporation. Two of the tests drilled by Seaboard struck oil at about 580 feet from a sand in the Lower Yaque formation, Middle Miocene. The wells are capable of producing about 300 barrels of 21° Baume gravity oil per day. Most of the holes drilled at El Higuerito had good showings of oil, and at least one well produced several barrels. Other wells will be drilled undoubtedly in the near future on other structures.

On the whole the prospect for Miocene and Oligocene oil in Hispaniola appears to be good, and undoubtedly several oil fields will be opened up. The best territory appears to be the geosynclinal areas along the north and south borders of the island and along the west coast of Haiti.

Late in February Dominican Seaboard's Magote 1, a 6000- or 7000-foot project, was nearing 3000 feet.

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● *Green Head 2-Way Replaceable Blade Type Bit.*

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Fifty Rigs Kept Busy As Cuba Attains Peak

Greater exploratory efforts scheduled to continue as result of seismic survey discoveries in 1939

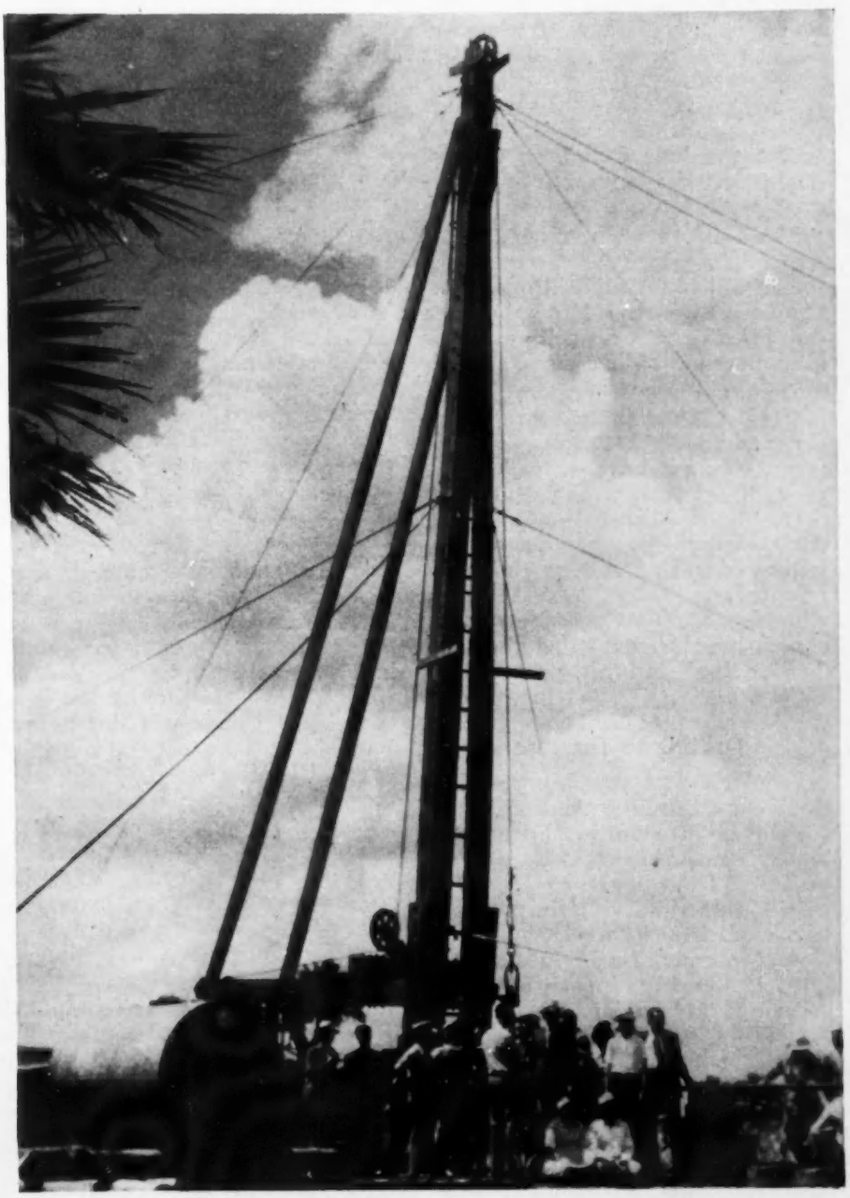
CHARLES GINART of Los Arabos, Cuba, writes that prospecting in the Montembo Basin, where wells produce practically pure gasoline, reached a peak in 1939, as did regular exploitation drilling.

Montembo Basin's year closed with a record number of completions, a record number of rigs in operation, and an almost phenomenal increase in the potential daily production of the area. Field activity was, broadly speaking, about twice as great as it was in 1938, and the intensity of current leasing campaigns and the struggle for concessions indicate that this condition will prevail for most of 1940.

Leaders in the current flurry of Motembo Basin activity include Motembo Mining Company, San Antonio Securities Company, Latin American Nafta Company and Compania El Valle de Motembo, S.A. Altogether the area lists 19 operating companies and 50 actively drilling rigs.

New Areas Busy

From the standpoint of field statistics, the greatest increase in activity was reflected by the relatively new Waldo concession area and in the adjacent Yonides and Luisa Marcela concessions. Here, Ginart says, 75 wells were put on production during 1939, some of them recording initial production figures ranging from 54 to 125 gallons per day. [In terms of crude-oil production this would be very small yield, but it should be remembered that the wells of Motembo Basin yield practically pure naphtha.] Commercially, the new production was sufficient to warrant construction of workers' camps and other facili-



The Number 1 well drilled by Petrolera Nacional de Motembo in the new Waldo concession of Cuba. This company has drilled 17 wells on the concession with a record of 14 naphtha producers.

ties. In addition, the operators have started work on a 16-mile road which will connect with one of Cuba's main highways.

Latin American Nafta Company through drilling over 20 wells on the Yonides concession has extended the productive area of that concession considerably. In addition, it has tested out several other likely areas nearby. Compania Petrolera Nacional completed 15 wells on the newly productive Waldo concession and all but 2 of these were productive of the high-gravity oil peculiar to the region.

Motembo Mining Company started a test on what is known locally as the Port Arthur concession, but was forced to abandon at 1200 feet because of mechanical difficulties and because of having started with too small a hole. Gas showings were encountered at 1200 feet, where the hole caved, so the organization is rigging up on a second location nearby.

The past year saw recorded the largest completion ever on record in Cuba. Oil Well Drilling Company's well in the Motembo area flowed through four-inch outlet for four months and five days.

Among other operators in the Motembo area, Santa Clara Nafta Company and San Antonio Securities Company have extended the productive areas of their holdings on the Fausto concession and have done exploratory drilling on the latter concession and on the Marguerita concession. W. T. Coles, who also holds a Cuban petroleum concession, has extended the productive limits of his property in Block 20.

Drilling to Increase

It is felt that possibly 25 additional rigs, bringing the total up to 75, will be in operation in the Motembo Basin during 1940. This is because 14 out of the 19 operators have production, and the product brings $11.88 per barrel. Shipments from Motembo Basin in 1939 totaled 79,430 drums, each of which contained 54 gallons. Their value was $943,628, substantially greater than Cuba has ever recorded before and definitely reflecting an upward trend in production there.

According to Roy Dickerson, geologist with The Atlantic Refining Company, which has done considerable prospecting in Cuba during the past few years, and who speaks not only of activities of his own company but of those of Shell Mex de Cuba,

Shell's principal activities have been in the western part of Habana province, about 15 miles from Habana and near the town of San Antonio de los Banos. Speaking of this region, Dickerson says, "The Shell has drilled two deep wells in this vicinity. It has also put down a series of core holes in an area about 10 miles south of Colon, Matanzas Province."

During 1939 The Atlantic Refining Company drilled a well to 4034 feet near Remedios, on the northern coast of Cuba and in Santa Clara Province, and another to 6020 feet about two miles northeast of Colon in central Cuba. Mechanical difficulties stopped the first test. The second also, was a failure.

Other Wildcatters

Dickerson told those in attendance at the annual foreign production symposium of the American Institute of Mining and Metallurgical Engineers in session in New York in mid-February, 1940, that Lloyd Brown was drilling a wildcat three miles north of the small producing field of Bacuranao and that Ruiz Williams and associates had recently completed a producer on the Gilda concession near the Motembo field, 100 miles east of Habana.

Shell Mex de Cuba's first well was Ariguanabo 1. Drilled about two miles west and one mile north of San Antonio de los Banos, it was based on seismograph work done in 1935 and 1936, torsion balance work done later, and a series of core holes varying in depth from 500 to 1200 feet, several of which gave oil indications in Oligocene formation. Signs of oil were reported at frequent intervals in the sandy phases of the Upper Cretaceous shale and the tuffaceous conglomerates of the same age. The well, however, quit drilling at 5200 feet in gabbro, according to one source.

Encouraged by showings in Ariguanabo 1, Shell Mex de Cuba moved to a location about ½ mile south and drilled to 10,034 feet, getting indications of oil but no commercial production.

[It might be permissible to remark parenthetically at this point that Cuban and Santo Domingan wildcats have the reputation of coring the most perfect textbook geology cores found anywhere, but that the problem of obtaining production is a horse of another color. In speaking of experiences in this part of the world, E. de Golyer was heard to remark in New York that no outstanding geologist's education was complete until he had drilled at least one wildcat in the neighborhood.]

On the Mercedes concession of Shell Mex de Cuba, south of Colon and in Matanzas Province, the organization has drilled a number of core holes, the deepest of which went to 4015 feet. Showings in these holes are held in some circles to confirm the alleged existence of petroleum gas at Jacan, eight miles north. But the concession has not yet entered the ranks as a producer of either oil or gas in commercial quantities.

The Atlantic Refining Company's Puntilla 1, located 1½ miles southwest of Remedios, on a long, narrow surface-defined structure in the first line of folding, found first indications of oil in the Remedios Group limestone at 2306 feet, where capillary veins began to be filled with asphaltic residue.

The second wildcat of The Atlantic Refining Company was spotted two miles north of Colon, Matanzas Province, on a seismograph high where a marked fold in the rocks of Middle Eocene and Oligocene had been indicated. Although oil was expected in a coquina at the base of the Middle Eocene, the wildcat passed on into the Upper Cretaceous without finding commercial production down to 6020 feet.

Dickerson says that this coquina occurs in a surface outcrop located at Angelita quarry, 12 miles northwest of Criollo 1.

As the year opened The Atlantic Refining Company was making geophysical investigations with the gravity meter and seismograph in the north coastal plain of Cuba from Remedios to El Santo, northwest. Obtaining reflections from about 18,000 feet indicates a great sedimentary section for the region around El Santo. Gravity meters are working in the shallow areas north of this town.

Cuba's commercially productive spots are two. Production of Motembo Basin was put at from 150 to 200 barrels daily in mid-February, 1940, while that of Bacuranao was put at 14 barrels daily.

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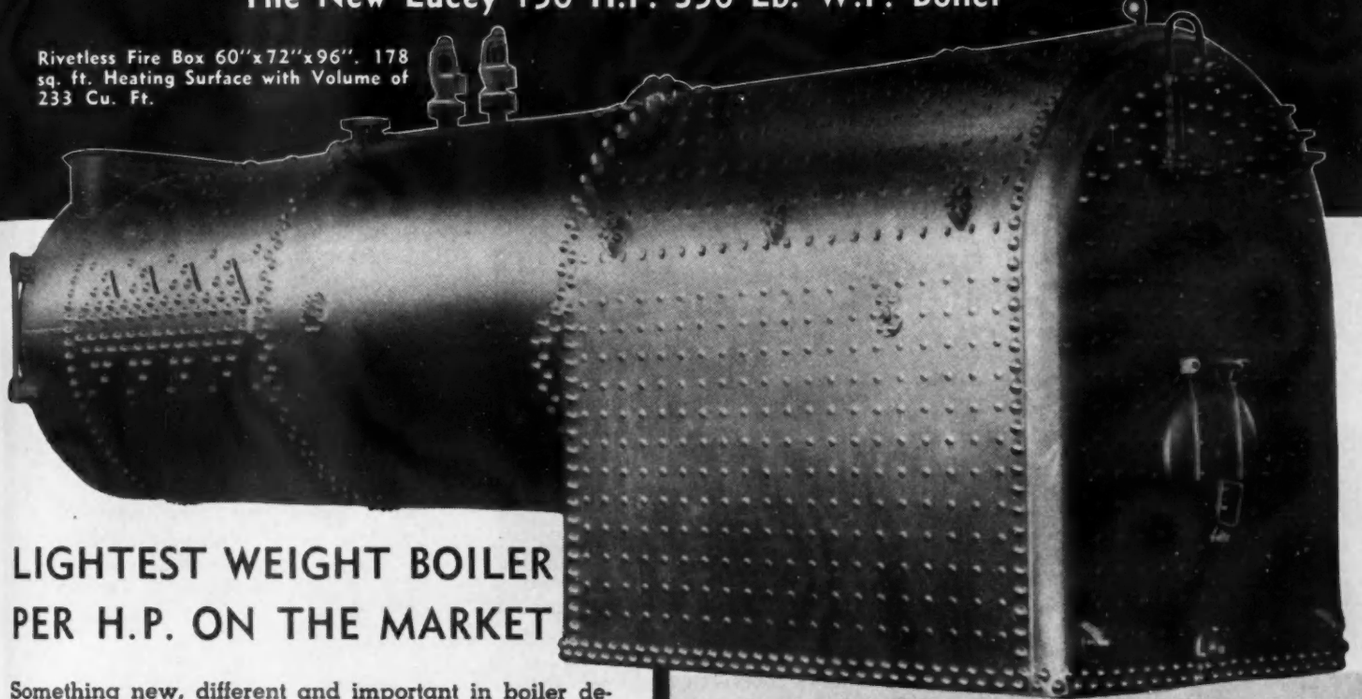

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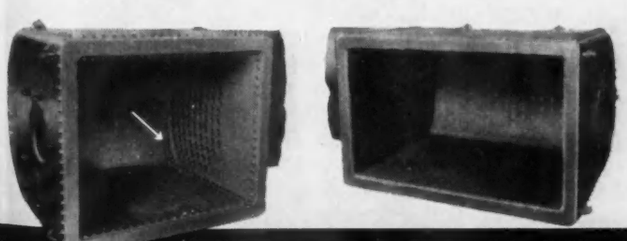

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The Mexican Oil Seizure

MANY will think that a forceful confiscation invites and justifies a forceful resistance. But the evil in appeals to force, except in self-defense, is being sufficiently demonstrated in the Eastern Hemisphere to discourage emulation here.

But where is it possible to find a solution devoid of some element of compulsion unless parties in conflict either voluntarily agree upon a settlement, or voluntarily agree to have their controversies settled for them by others? Yet when a government seizes property and rejects a demand for restitution, while at the same time it declares both its inability and unwillingness to make full and assured compensation, what solution is available unless such a government can be induced to submit voluntarily all the issues of the controversy to an impartial judgment?

Public opinion adequately informed should arrive at a sound judgment as to what ought to be done; and it is reasonable to hope that such a judgment will determine what eventually will be done.

On March 18, 1938, Lazaro Cardenas, president of Mexico, issued a decree under which his government seized the properties of 17 corporations variously engaged in the production and distribution of oil and oil products in Mexico. These corporations were all foreign owned, although organized or authorized to operate under Mexican law.

All records and files in the companies' offices were seized and all representatives of the owners were expelled by force.

Unable to Pay

The inability of Mexico to make compensation [as prescribed by international law] was well known to all informed persons. Dr. Luis Cabrera, writing a series of articles in the Mexican magazine, "Hoy," in the summer of 1938, reached the conclusion that Mexico could not pay for the oil properties, whether valued at a minimum of $262,000,000 or a maximum of $500,000,000, even by installment payments spread over a period of 20 years. The government of Mexico itself did not deny its financial incapacity.

DONALD R. RICHBERG

IN VIEW of the fact that it has been definitely inferred that the United States Department of State will again be called upon to exercise whatever influence it can to obtain a settlement of the controversy between the oil companies and the Mexican government, the following statements, extracted from Donald R. Richberg's report of negotiations with President Cardenas and Ambassador Castillo-Najera on behalf of the companies, are presented to form a background or foundation for appreciation of news expected to emanate from Washington during 1940.

The so-called "expropriation" of foreign-owned oil properties was, therefore, in fact a forceful confiscation, which left the owners with two sources of possible redress. First, they could appeal to the Mexican courts for a restoration of their rights. Secondly, they could appeal to their respective governments to demand a return of their properties on the grounds that Mexico could not legally expropriate them because of its obvious inability to compensate the owners either promptly or adequately.

Appeal which the companies made to the courts was fruitless, since the Mexican government was openly engaged in carrying out a political policy of nationalizing the oil industry.

The major part of the value of the oil company properties lay in the sub-soil, where, after enormous costs of exploration, rich oil fields had been finally proved and tapped by producing wells. But President Cardenas expressly stated that the "expropriation . . . cannot give rise to the payment of any compensation or indemnity for the petroleum, et cetera, existing in the subsoil, since these belong to the direct domain of the nation."

Valid titles to these sub-soil rights had been obtained by the companies in accordance with Mexican law. Their validity had been repeatedly sustained by the Mexican courts.

Diplomatic Moves

Facing the realities of this situation, the foreign owners of the oil properties asked their respective governments to demand return of the properties. Such action was strongly urged by the British government in an exchange of notes during April and May, 1938, which ended in recall of ministers by the Mexican and British governments. Similar representations were made by the Netherlands government without avail. Public statements of Secretary Hull on March 30, 1938, and Acting Secretary Sumner Welles on August 14, 1939, clearly stated the United States position—that a legal expropriation could not be consummated except in conformity with the established principle of international law which required prompt, adequate, and effective compensation to be paid to the owners of the properties taken. In his note of July 21, 1938, Secretary Hull said: "The taking of property without compensation is not expropriation. It is confiscation. It is no less confiscation because there may be an expressed intent to pay at some time in the future."

There can be little question that

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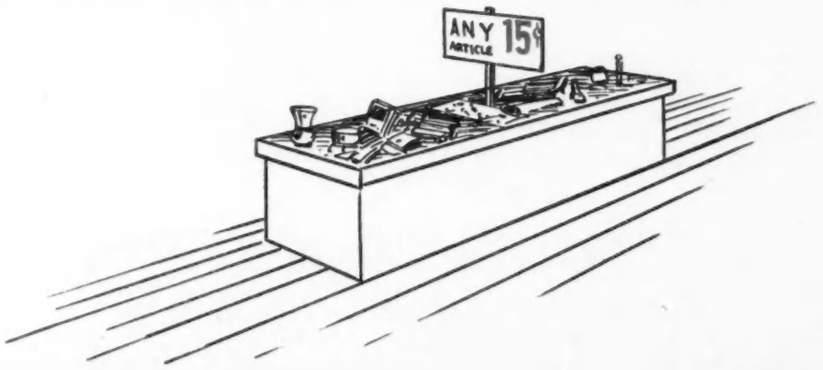

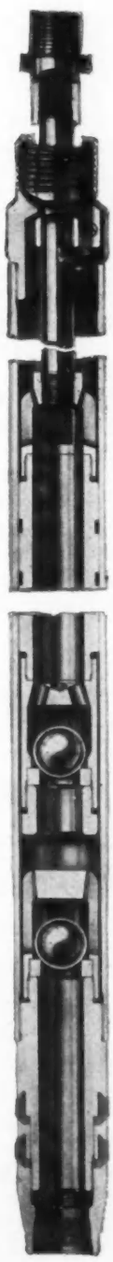

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DEEP WELL PLUNGER PUMPS & SUCKER RODS

the prosperity of Mexico particularly depends in a large measure upon foreign trade and upon the development of its natural resources and the employment of its labor through investments of foreign capital. When then does the deadlock continue?

Explanation of Deadlock

It has become evident in the last 30 years that until the Mexican people have the education and understanding essential to actual self-government, they will be ruled by that percentage which has some education and understanding and can wield an autocratic power through control of civic or military organizations.

In the search for an economic system, Mexican counsels have been divided by doctrines, fears and self-interest. The dominant radicals would like to see the government supply the functions of management and capital. They would create some form of state capitalism and socialism. The more conservative would like to see private enterprise supply management and capital, but many of them are unwilling to obtain capital where it can be gotten—from foreign investors—at the price of giving to such capital the incentive of attractive profits and such security as may be found in the control of management.

So the turmoil of Mexican politics in the last 30 years rises from the inability of any group temporarily in power to establish a political-economic system holding forth the prospect of a continuing improvement in the living conditions of the masses of the people.

Labor organizations, through collective strength supported by government, have compelled improvements in the earnings and living and working conditions of those who are employed. But the opportunities of employment and the expansion of industries and the number of industrial workers have been definitely retarded by the increasing discouragement of capital and management. Attempts to increase employment artificially (by such means as requiring the oil industry to hire unnecessary workers) operate in the end to reduce employment by reducing investments which demand the protection of an efficient management.

Communal ownership of property and a communal sense of responsibility of one man for his neighbor are traditional in Mexican life; also ruthless, self-chosen rulers of tribes, or provinces and of the whole country are traditional; antagonism to foreign exploiters and conquerors has been bred into the lives of generation after generation throughout the Mexican people.

Importance of Oil

Through the adventurous courage of foreign explorers, principally American and British, the oil resources of Mexico were uncovered and developed. American and British adventurers risked and spent their lives, and all the money they could command, to make Mexico in a few years the second largest oil producing nation in the world—from which position it has steadily declined because of internal Mexican obstruction until in 1938 Mexico produced less than two percent of the world's oil. Foreign investors, through development of the oil industry, produced for Mexico one of her largest sources of wages for workers and revenue for the government. Long before expropriation, oil workers were the highest paid class of workers in the country.

From the beginning of the revolutionary period in 1910 down to the expropriation, the foreign-owned oil companies of Mexico have never been treated by the Mexican government as beneficial or even tolerable influences. Antagonists to the oil companies will assert that their rights to develop Mexican resources were acquired through defrauding ignorant people and through bribing corrupt public officials, and are, therefore, unworthy of respect. The oil companies can offer a strong defense against such charges.

Nationalization the Cause

The fundamental reason for the expropriation of the oil properties will not be found either in the conduct of the companies and their predecessors in the development of the industry. The real reason will be found in tracing the struggle of the Revolutionary party in Mexico to dispossess the oil companies and to nationalize the entire oil industry as an essential part of the effort to establish a new political-economic system, which is the yet unrealized aim of the Mexican revolution.

When President Cardenas and other Mexican government officials now assert that the 1938 expropriation "cannot give rise to the payment of any compensation or indemnity for the petroleum (et cetera) existing in the sub-soil since these belong to the direct domain of the nation," they are repudiating previous international agreements made by the Mexican government. They are repudiating the law Mexico laid down in its constitution as repeatedly interpreted by the Mexican supreme court, when it was an independent tribunal.

During the administration of President Cardenas the tenure of the justices of the supreme court has been reduced from life to six years. The supreme court has been transformed into what has been described by the attorney general of Mexico as a "helping element" of any existing administration . . . The decision upholding the Cardenas expropriation was simply a political endorsement—not to be regarded as a judicial ruling.

Labor Troubles

[Richberg's treatise at this point goes into labor difficulties between the companies and the workers, difficulties which he infers were aggravated by the government and the union leader attitudes, that resulted in demands which the companies felt they could not meet and stay in business.]

Following the affirmance of the labor award by the supreme court, the companies worked desperately to effect a settlement of the controversy. Accepting the labor board's own estimate, they offered to increase the wages to the extent of 26,000,000 pesos a year. This offer was refused by the government, and the true reason for the refusal was proved some months later when Toledano [leader of Mexico's C. T. M., a radical labor organization] made a speech in New York City in which he said:

"This offer Cardenas refused. If we had accepted, it would have been a victory of labor over capital within the Mexican oil industry; but by refusing the offer we won a great victory for the Mexican people against foreign imperialism."

In response to pressure from the United States government, informal and tentative suggestions were presented to the State Department wherein the Mexican government expressed its willingness to enter into negotiations for determining the amount and method of paying compensation, not promptly but by installments over a period of 10

Repeat Orders Prove their MERIT

The performance record of Atlas Pumping Units make them the ideal equipment for foreign fields. Their comparatively low first cost and minimum upkeep represent real economy and trouble-free operation. Their engineering design and rugged construction insure long life and that uninterrupted service so essential to maximum recovery at minimum costs.

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- **ATLAS CHAIN DRIVEN UNITS** are particularly recommended for foreign service, because they are built with standard chains and bearings which are easily obtainable in case of emergency.

BRIEF SPECIFICATIONS

UNIT NO.	401	402	708	808	1002
Reducer Type	Chain	Chain	Chain	Chain	Chain
Beam Rating	4000 lb.	6000 lb.	7416 lb.	7416 lb.	10222 lb.
HP Rating	6.00	6.00	6.00	9.6	11.25
Peak Torque	30000	30000	30000	47768	55724
Maximum Stroke	24"	24"	32"	32"	44"

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THE WEBER TYPE "F" GAS ENGINE

A heavy-duty, medium speed engine priced comparable to high speed engines. A powerful single cylinder, two-cycle gas engine with 7½" bore x 9" stroke, rated 25 H.P. at 550 R.P.M. Flexible and versatile for wide range use.

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A plus quality at the price. Low first cost with single cylinder simplicity. Efficient, economical operation.

COMPACT
No wider than main skids of pumping unit. Minimum height. Weatherproofed for outside operation, yet easily housed if desired. Quick portability and installation.

RUGGED
Large crank shaft and bearings mounted in heavy rigid frame for life-long service. No delicate adjustments. Sturdy construction.

- Force Feed Lubricator.
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- Enclosed Governor.
- Rotary Magneto.
- Hyatt Roller Main Bearings.
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- Centrifugal Water Pump.
- Radiator Cooling System.

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years, such installments to consist of a percentage of the proceeds of export sales of oil.

Companies Stymied

If the companies had undertaken to negotiate with Mexico on this basis the effect would have been to place them in the position of (1) conceding the legality of the expropriation; (2) accepting the status of creditors of a nation already heavily in default on prior obligations; (3) waiving any right to compensation for the larger part of their properties (the enormously valuable sub-soil rights in proven oil fields); (4) encouraging Mexico in its declared intention to reduce even inadequate valuations of surface properties by mammoth counter-claims for "severance pay" from March 18, 1938.

So a practical program was devised late in 1938 under which the properties would not be simply returned to the owners, but would be operated by them for a fixed period of years for the common benefit of the Mexican people and the foreign investors, with due protection for the interests of the workers and the government, and in the end all the interests of the owners would be transferred to the Mexican government without imposing on the government the financial burden of compensation or necessary further investments to develop the properties. Negotiations on this basis were arranged through the Mexican embassy in Washington and began in Mexico City on March 8, 1939. These negotiations were carried on between President Cardenas and Donald R. Richberg, as representative of the oil companies, with Dr. Francisco Castillo-Najera, Mexican ambassador to the United States, participating both as an interpreter and, in the absence of President Cardenas, as his representative. The major groups of foreign investors were represented.

Two Main Obstacles

President Cardenas orally and in writing accepted in principle a plan of collaboration between the government and the oil companies during those negotiations. Other agreements as to the bases and principles underlying the long term contracts between the government and the oil companies were practically reached, but two questions of considerable difficulty arose. The first question arose out of the insistence of the Mexican government that the expropriated oil properties should be valued as a basis for fixing some of the terms of the contract. Since agreement upon such a valuation was obviously impossible such a requirement would prevent the making of a contract. The second question arose from the insistence of the government upon imposing its political management on the oil properties, which would represent past and future investments of the companies which, under contract, would take the risk of recompensing themselves for such investments out of future operations.

Richberg told Mexico at this point that further conferences would be fruitless if the attitude of the Mexican government on the foregoing two questions remained unchanged. Whereupon on April 12, 1939, Castillo-Najera informed Richberg by telephone:

"Persuant to instructions from the president, I wish to advise you that discussion regarding the valuation will be postponed until the end of the negotiation; no discussion of this point will be undertaken provided a satisfactory agreement is reached through other means. The Mexican government agrees to discuss the proposition that refers to contract with each one of the companies. [Standard Oil Company (New Jersey), Standard Oil Company of California, Sinclair, and British interests.]

Saltillo Conferences

Resumption of conferences in Saltillo, Mexico, resulted in the issuance on May 3, 1939, of a joint statement by President Cardenas and Richberg reading in part as follows:

"The discussions have been fruitful, and effective progress has been made toward a mutually satisfactory agreement . . . It is anticipated that in the near future the negotiations will reach a definite conclusion without the need for further oral discussions between President Cardenas and Mr. Richberg."

Apparently vigorous opposition to the program developed among the advisors to President Cardenas as soon as it was revealed to them. Press reports following the Saltillo conferences told of labor and political delegations that waited upon the president and made demonstrations protesting against any return of private management to any part of the oil industry.

More than six weeks later Richberg received from Cardenas a discouraging memorandum receding from previous agreed positions and leaving the negotiators back at the original starting point. Following this setback, Richberg and Najera worked out a second modified draft of a basis for contracts to be negotiated in settlement of the oil question.

On July 5 Najera wrote Richberg that the Mexican government accepted the plan of collaboration between the expropriated companies and said government, but took the position that the corporations to be organized should be under absolute control of the government, which would appoint the president and a majority of the board of directors of each corporation. Richberg wrote Najera on July 17 pointing out the inconsistent, unacceptable nature of such a proposition. He said in part: "It was certainly understood that the corporation being formed by the investors would represent their interests and be a private industrial enterprise. Obviously it would not be a government corporation since it would enter into a contract with the government for the development of the oil properties created, and to be expanded, by investors of private capital."

Then on September 1, 1939, in a message to the Mexican congress Cardenas charged the oil companies with responsibility for compelling the expropriation, with refusing to negotiate for payment of indemnification, with seeking diplomatic intervention, and with trying to negotiate a return of the properties and an exclusive administration of the business "during a period which, practically, would last until exhaustion of our oil fields." He then declared: "I do not believe that any government could have accepted an agreement which, from the beginning, disclosed such infamous proposals."

The oil companies are thus compelled to make renewed representations to their respective governments regarding this wilful breach of obligations that the Mexican government owes to the citizens of other nations who have been induced to invest capital upon the express assurances of domestic law and of diplomatic understandings that elementary rights of property would be preserved.

Get the Facts on Un-Cored Formations with the

HUNT SIDE WALL SAMPLER

The Hunt Side Wall Sampler with wire line retractable core barrel, as illustrated herewith, is designed to recover samples of un-cored formations from the side wall of a hole. After drilling to a predetermined depth, the well may be electrically logged and side wall cores obtained of all possible producing formations, quickly and at low cost.

Briefly, the tool is run in the hole on regular drill stem, a conventional drilling bit being provided on the lower end of the tool to permit drilling out bridges, if necessary (Fig. 1). A circulation plug, which seals the core tube opening in the side of the housing, may be used when it is desired to circulate drilling fluid to the blades of the bit. The plug is retrieved by means of a wire line overshot. After placing the tool in the hole at the depth from which a core is desired, the retractable core barrel is either dropped or lowered on a wire line through the drill stem to its seat within the housing. A spring-actuated deflector arm forces the core tube against the side wall of the hole (Fig. 2). Lowering the drill pipe slightly forces the core tube into the formation to obtain the sample (Fig. 3). A wire line overshot retrieves the core barrel. Any number of formations may be cored in this manner without removing the drill pipe from the hole.

WRITE FOR FULLY DESCRIPTIVE FOLDER

Licensed under Patents 1683642, 1815661, 2176375. Other patents pending.

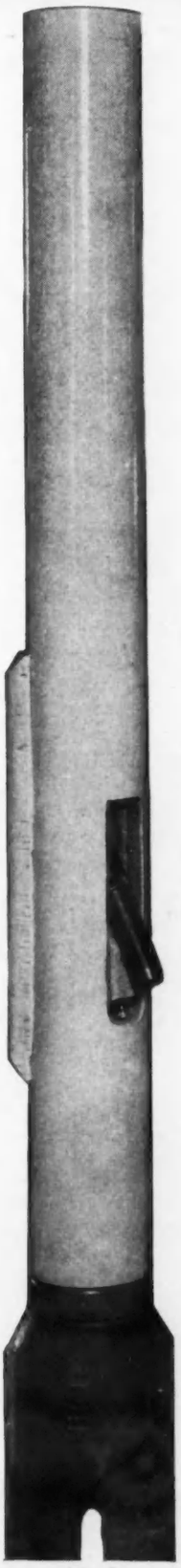

Fig. 1

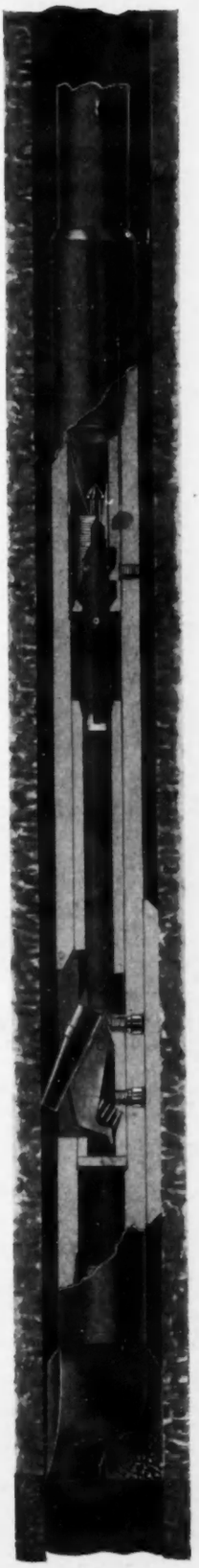

Fig. 2

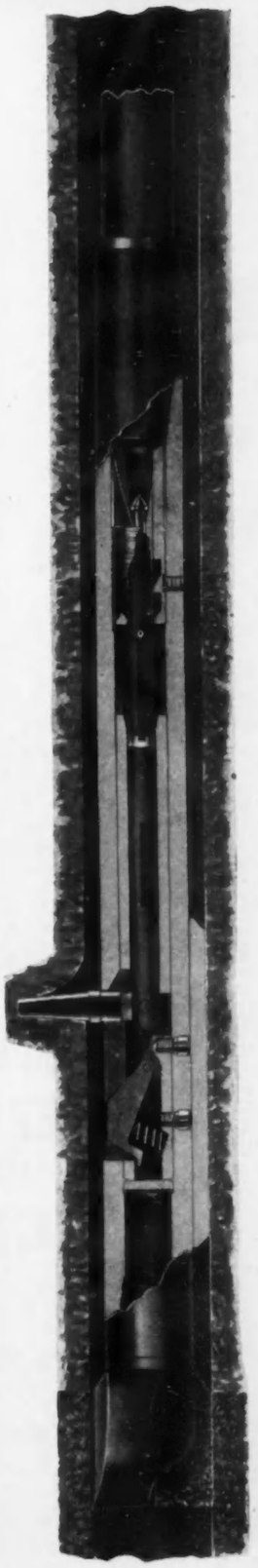

Fig. 3

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HOUSTON, TEXAS, U. S. A.

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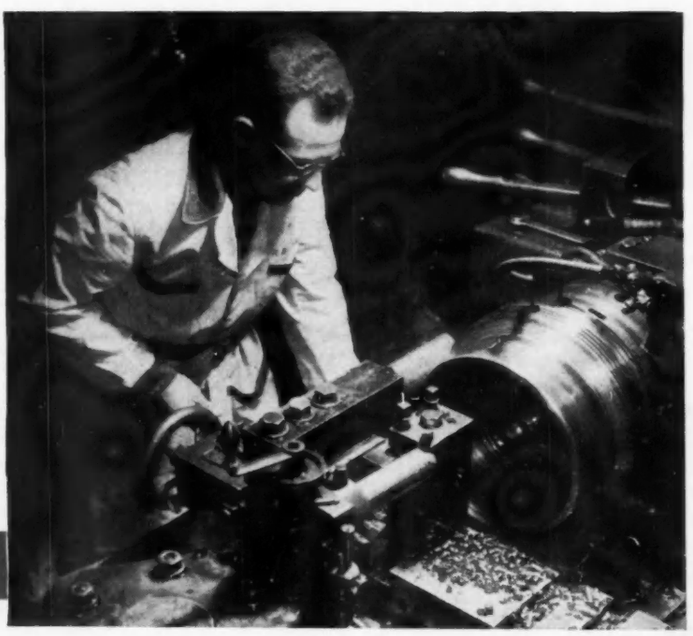

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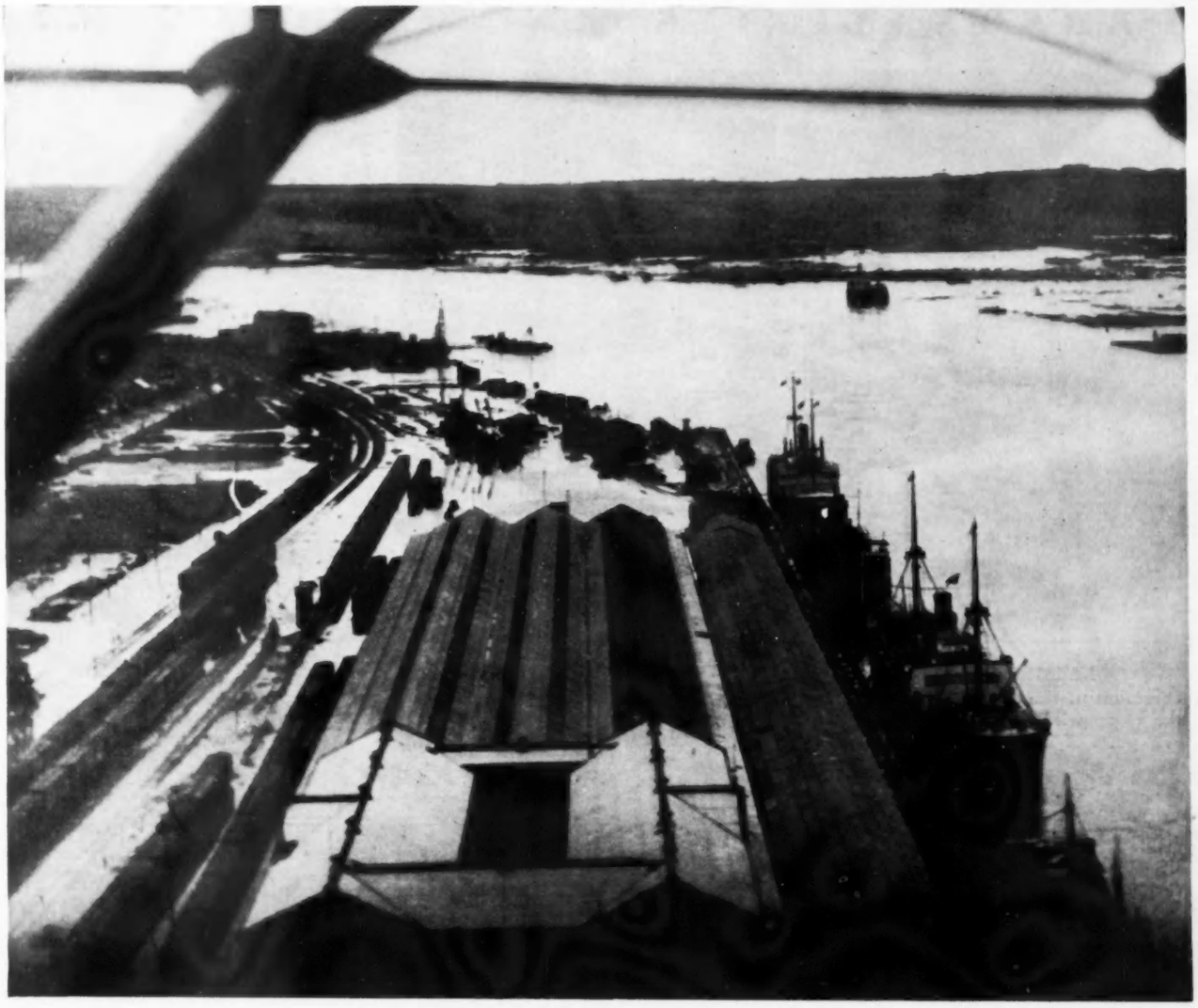


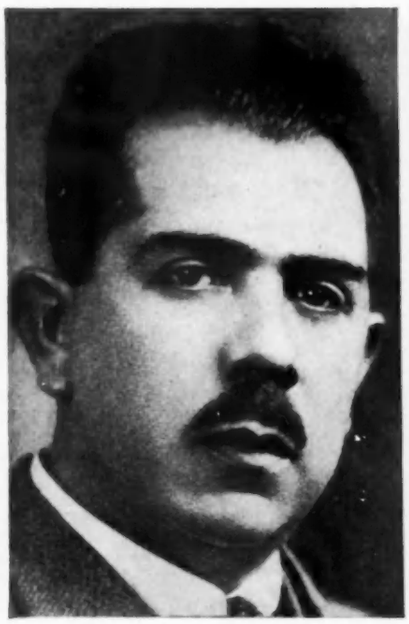
Air view of tankers loading oil at Tampico terminals

Japanese Entry Alters Mexican Prospects

MEXICO entered 1940, after 21½ months of operation of the extensive properties expropriated from American, British and Dutch interests with settlement of this growingly tense question still a matter of major concern in the country.

President Lazaro Cardenas' positive declaration that Mexico would not agree to submission of the issue involved to arbitration has been interpreted in Mexico as meaning that the chief executive is keeping open the door for further negotiations with the companies.

In the meantime, despite a somewhat scandalous spat between the administrators and the workers of the government oil administration, the government oil monopoly is carrying on with ambitious plans for the future. Fourteen new producers, with an aggregate initial yield of 27,064 barrels, were brought in during 1939. All of these, however, were in proven territory. Exploration of new areas has been very meager, though the government administration has



LAZARO CARDENAS
President of the republic and author of the expropriation decree, envisions exports of 200,000 barrels daily.

VICENTE CORTES HERRERA
Head of government oil production, must reduce personnel, cut salaries, and keep workers happy.

JESUS SILVA HERZOG
Head of sales, must find a market for expropriated oil or witness failure of a pet government project.

had seismograph crews busy in the Isthmus of Tehuantepec, according to official reports.

Japanese Active

The most pronounced new development is being carried on with Japanese capital in the Panuco area. The exploration is being carried on by Compania Petrolera Veracruzana, S. A., subsidiary of Compania Petrolera Laguna, Japanese controlled enterprise. Reports are Veracruzana has let contracts for the drilling of 30 wells in the Rayon section north of the Tamesi river, boundary between the states of Tamaulipas and Veracruz. Veracruzana is also operating in the San Carlos district of the Isthmus of Tehuantepec, where it has one small producer of 25 to 30 barrels daily production near the village of San Carlos. Derricks, boilers and engines for the Tamesi river wells are already reported placed on locations.

Buys Two Tankers

The government administration recently announced the acquisition of two new tankers, the 10,000 ton Binta, formerly under Norwegian registry, now re-named the Cerro Azul after the fabulously rich Cerro Azul No. 4 well in Mexico, and another given the new name of Juan Casiano.

The Cerro Azul was acquired while at Mobile, Ala., for purchase price reported as $600,000. Shortly after announcement of the deal, the government administration instructed the AGPN (Administration General del Petroleo Nacional), the government oil organization existing prior to the expropriation, to start immediate delivery of oil up to the value of purchase price to the former owners of the vessel.

The Juan Casiano was acquired in the United States, according to report from Tampico.

These tankers are the first of an oil fleet of 24 vessels to be acquired by the government administration, it was announced. It is planned to get additional tankers from Norwegian interests and hopes of ultimately getting the German oil carrier, Tine Asmussen, a refugee in Mexican port since the outbreak of the war, are still entertained despite British objections that have blocked the transfer of the vessel so far to Mexican ownership. Mexico still has a large trade credit in Germany for oil exported prior to the start of the war.

In addition three tankers are being constructed for Mexico in Genoa under terms of the deal with Italy several months ago. Delivery of these is scheduled for the middle of June. The oil administration is also now operating two small coastwise tankers.

To Make Ethyl

Interpreted as significant in view of plans for the future, was the announcement at the close of 1939 by the Ministry of National Economy, under which the government oil administration functions, that the patents on ethyl fluid held by General Motors Corporation had been declared non-existent in Mexico. This was construed as a preliminary step in plans by the government administration to manufacture the compound used to raise the octane rating of gasoline.

The patents in question are held in the name of General Motors, but joint ownership is enjoyed by the Standard Oil Company of New Jersey. Ethyl fluid was introduced in Mexico at Tampico in 1926.

Attorneys of General Motors were notified the patents were held extinct on grounds that the Mexican patent law requiring notification of introduction and use of the product covered was not properly observed. Under this law a patent expires within 15 years in the ab-

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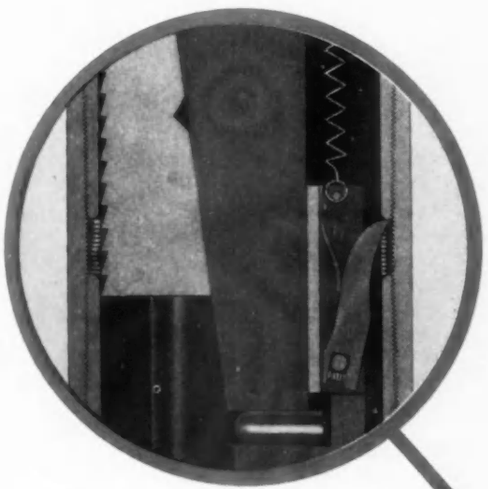

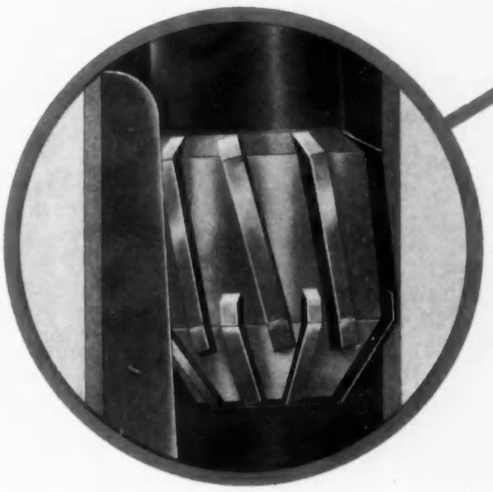

A MILL-OUT BETWEEN COUPLINGS

A patented feature of the Kinzbach Whipstock is its arrangement for setting in a coupling and the user's assurance that **the window must be within the one joint of casing,** eliminating all chance of milling out a joint and parting the casing string. Since the slip always engages the pipe at the point reinforced by the coupling, any distortion which might interfere with the wedging action of the slip is minimized.

The hinged feature assures that the top of the Kinzbach Whipstock will lay back against the pipe at all times. The setting method allows it to be removed from the hole if necessary. The design permits its orientation in the hole to mill out in any desired direction.

A LONG, CLEAN WINDOW

There is a Kinzbach Mill to match the requirements of any milling job regardless of casing quality or the conditions involved. The spiral setting of Kinzbach insert blades assures a uniform depth cut and minimizes the danger of drill pipe twist-offs.

Kinzbach Milling Tool Blades are made of high speed tool steel, are properly heat-treated, and are precision ground to provide the most efficient cutting action possible. Kinzbach Mills are proved in more than 12 years of field service to **cut a long, clean, consistent window every time.**

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KINZBACH

sence of required procedure. The patents were granted in 1922 and 1923.

At the time of the introduction of ethyl fluid into Mexico, affidavits certifying purchase and use of the product were obtained from buyers and filed in the name of General Motors with the government. Additional notifications were filed in 1927, 1929, 1932 and 1934.

In declaring the patents nonexistent, the government ministry set forth that the designation "ethyl fluid" was not used in the application for patent rights, that the buyers whose affidavits were filed did not refer to the industrial use of the product, and that said buyers included merchants and bankers without sufficient technical knowledge to know the chemical contents of what they bought.

It has been impossible for the government oil administration to buy ethyl fluid in any quantity since the oil expropriation in 1938. Mexican gasoline, in consequence, under government operation, has been of an inferior quality, a matter that has been responsible for much complaint in the republic.

Technicians of Petroleos Mexicanos have now installed in Atzcapotzalco (refinery near Mexico City that was expropriated with other properties) an ethyl plant, thereby creating a new industry with certain and excellent perspectives; the capacity of this plant may be increased but is now sufficient to improve the gasoline for local consumption. The cost of the plant was a million pesos, according to President Cardenas.

Plans for 1940

President Cardenas had various other things to say about the progress of the oil industry in his New Year's message. Concerning exploration for developing new supplies, he said:

"Using its own technical resources, Petroleos Mexicanos is now effecting geophysical explorations in known oil zones and is carrying out a vast exploratory program of the oil lands in the southern and northern parts of the state of Veracruz and the state of Tabasco, having already contracted drilling equipment to the value of 3,600,000 pesos."

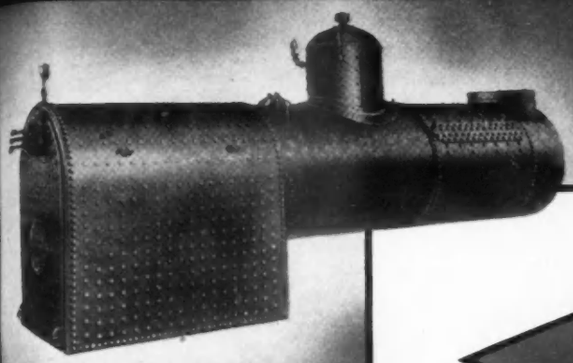
He continued: "Various pipe lines, which were in bad condition, have been replaced, and there is now under study a plan for a gas line of 245 kilometers between Poza Rica and Mexico City, which will permit the utilization of gas fuel which is now being wasted.

"During 1940, from 25,000,000 to 30,000,000 pesos will be invested in refineries, raising their total capacity from 110,000 to 178,000 barrels daily.

"In comparison with 1938, domestic sales have shown a considerable increase during 1939: 172,000,000 pesos were earned in this regard in 1939, as against 153,000,000 in 1938. Exports during the first eight months of the year

ADMINISTRATION HEADQUARTERS

Former headquarters for Mexican Eagle (Aguila) Company in Mexico City taken over by the government under expropriation and used by Petroleos Mexicanos for administrative offices.



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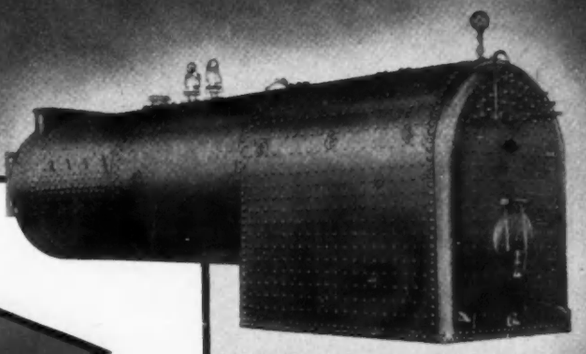

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Built from high tensile plates. Maximum strength with minimum weight. Have Lucey Welded Fire Box — 60" wide, 72½" high, 96" long. No dome necessary. Space above curved crown sheet of fire box — 20".

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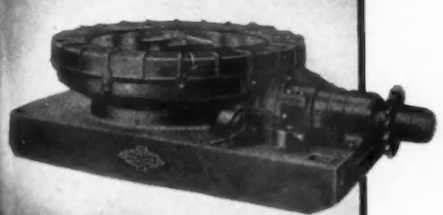

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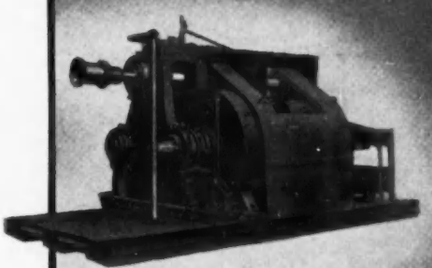
Built in three sizes: 17½", 20½" and 27½". A machine for any size or depth hole. Designed to give increased performance, greater safety and longer life at higher rotating speeds.



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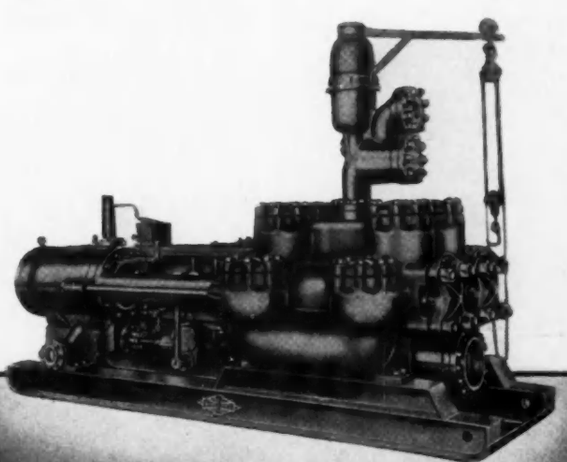
For deepest wells. Timken Tapered Main Load Roller Bearing. End thrust taken by SKF Ball Bearing located above main bearing. Two American Roller Bearings take radial thrust and insure stem alignment.



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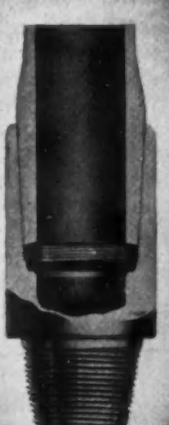
Built in two sizes: H-20000-BA, 16½" x 8" x 20"; H-20000-AA, 15½" x 8" x 20". Self-draining steam end. Steam and exhaust valves located below steam cylinders. Fifteen per cent estimated steam saving.



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Completing the first well in the Poza Rica field after expropriation.

(1939) reached a value of 60,000,000 pesos, and 15,000,000 in the last four. Of this, 40,000,000 pesos have been received in cash and 35,000,000 in barter deals with Italy and Germany whose fulfillment has been duly complied with, in spite of abnormal conditions which the latter country is undergoing.

"Operating and production expenses during the year 1939 reached 130,000,000 pesos, taxes 70,000,000, the acquisition of drilling equipment, plants and materials 56,000,000, wages and other salary disbursements 71,000,000. Among the most important social benefits, there must be noted the expenditure of 7,300,000 pesos for rental allowances in lieu of housing and 6,500,000 by way of saving funds."

Labor Troubles

The somewhat sensational exchange between management and workers was precipitated early in January when the Tampico newspaper El Mundo published a communication reportedly addressed to the oil workers by Vicente Cortes Herrera, general manager of Petroleos Mexicanos, production division of the government oil administration.

The communication in question was sent to the oil workers in con-

A scene in the Atzcapotzalco refinery on the outskirts of Mexico City. Formerly the Mexican Eagle (Aguila) refinery.

Mexican crew takes time out for a "breather."

vention in Mexico City during the summer of 1939. It set forth the reasons why the government administration couldn't grant the demands of the workers for increased salaries and benefits, that is, putting into effect the wage scale that had been demanded of the expropriated companies.

The memorandum rebuked the oil workers for asking increased wages on the grounds that lack of discipline, misconduct and lack of responsibility on the part of the workers had caused the government administration much concern and materially increased the cost of operation.

Labor costs at the time were described as having increased during the government operation more than the 26,300,000 hike asked of the foreign companies. Immediately after the expropriation, the memorandum credited to Cortes Herrera set forth, the industry had 15,895 workers and labor costs of 4,273,217 pesos a month. By July of 1938, 3½ months after expropriation, the number of workers had increased to 17,815 and labor costs to 5,016,701 a month. By July, 1939, the date of the communication, the number of workers had increased to 19,316 and labor costs to 6,500,000 pesos a month. This showed a labor cost increase in one year of 2,000,000 pesos a month, though the increase in production failed to show a proportionate gain, the general manager set forth.

Donald Richberg's booklet, "The Mexican Oil Seizure," which became the subject of an official government statement the latter part of January, has done much to heighten the tension over the oil question. It is abstracted elsewhere in this issue.

Meanwhile the Petroleum Workers Syndicate is preparing to celebrate, on March 18, the second anniversary of the expropriation.

Twenty-four completions in Mexico were recorded for 1939, with eight for each of the three general areas—Northern, Southern and Tehuantepec. Of these, 14 were producers, three for the Northern district, five for the Southern and six for the Tehuantepec area.

Initial yield of the 14 producers totaled 27,064 barrels. Poza Rica field in the Southern district was by far the most prolific in new production, contributing 22,500 barrels in initial yield of the 27,064 for the whole country. Initial production for the three new producers in the Northern district totaled 2300 barrels, for the six new producers in the Isthmus of Tehuantepec 2264 barrels.

All of the 14 producers of 1939 were brought in by various divisions of the government oil administration, six being in the Saline Basin of the Isthmus field. The Mexican Gulf completed two operations, but both failed to produce.

Completions for 1939 by fields were in detail as shown in Table 1.

Footage compilation showed a total of 14,934 feet drilled for the 8 wells completed in the Northern District, or an average of 1866 feet per well. The 8 completions in the Southern District aggregated 62,159 feet in depth, or an average depth of 7769 feet per well. Average completion depth of the Isthmus of Tehuantepec projects was 2675 feet, to give that district a total of 21,405 feet of hole drilled.

The Mexican Gulf's Maguey 1, in Tampacan, San Luis Potosi, an unexpropriated property, had a somewhat disappointing experience in its plans to go back to test a small showing. This operation had a gas blowout at 3850 feet with a 20 to 25 barrel a day showing of 44 gravity oil. However, the hole was carried on down to 8076 feet to the Jurassic for a dry hole completion January 28, 1939, in hard black limestone. Extension of its permit to go back to test the showing at the 3850-foot level was asked but, with no response after keeping the crew on the ground for three months, the operation was abandoned.

Drilling activities as of January 1, 1940, showed 18 operations, eight drilling and 10 temporarily suspended, with locations for 20 more, as indicated in Table 2.

Poza Rica Leads

The steady increase in Poza Rica production in recent years has been the major sustaining factor in Mexico's total yield. While the

TABLE 1
Mexican Field Activities in 1939

FIELD	Hacienda	Producer	Failure	Total
NORTHERN DISTRICT:				
South Tamaulipas by Mexican Gulf	Altamira	..	1	1
Tampico-Panuco area by Pemex (Gov't.)	Chapacao	3	4	7
SOUTHERN DISTRICT:				
Tampacan area by Mexican Gulf	Maguey, S. L. P.	..	1	1
Poza Rica-Mecatepec by AGPN (Gov't.)	Poza Rica	..	1	1
by Pemex (Gov't.)	Poza Rica	5	..	5
by Pemex (Gov't.)	Potrero y Ojital	..	1	1
ISTHMUS:				
Saline Basin by Pemex (Gov't.)	El Plan	5	1	6
by AGPN (Gov't.)	El Plan	1	1	2
Totals		14	10	24

general tendency in the Northern, Southern and Isthmus fields has shown a declining production since 1935, the Poza Rica yield has registered a gain of more than 4,000,000 barrels annually. This is all the more interesting by reason of the fact that Poza Rica has only 24 producers whereas the Northern field has 659, the Southern field 262 and the Isthmus 200.

Thus of Mexico's total production during 1939 of 42,662,000 barrels (using estimate for December yield) from a total of 1145 wells, Poza Rica's 24 wells contributed 26,042,000 barrels, or more than 61 percent.

Production in barrels by fields for the past seven years is shown in Table 3.

Average daily production by fields by months during 1938 and 1939 was as shown in Table 4.

The history of exploration for oil in Mexico shows that up to January 1, 1940, completions totaled 6527. Of these 2596 were producers —2584 being oil wells, 12 being gas wells. Failures, accordingly, totaled 3931. This shows that approximately 40 percent of the completions were brought in as producers.

Summary of all wells completed in Mexico up to January 1, 1940, with comparison of 1938 and 1939 completion records, is given in Table 5.

Mexican petroleum and petroleum products exports during 1939 were as follows:

Asphalt, 76,725 metric tons; Panuco crude, 4,226,000 barrels; Southern crude, 241,000 barrels; Poza Rica crude, 7,070,000 barrels; total crude exports, 11,537,000 barrels; fuel oil, 2,088,000 barrels; gasoline, 1,487,000 barrels; gas oil, 1,626,000 barrels; gas oil, bunkers, 157,000 barrels; fuel oil, bunkers, 836,000 barrels. Value of these exports was $15,461,500.

Exports from March 19 through Dec. 31, 1938, were: Asphalt, 36,445 metric tons; Panuco crude, 1,011,000 barrels; Southern crude, 87,000 barrels; Poza Rica crude, 2,939,000 barrels; total crude, 4,037,000 barrels; fuel oil, 1,108,000 barrels; gasoline, 1,619,000 barrels; gas oil, 2,145,000 barrels; gas oil, bunkers, 79,000 barrels; fuel oil, bunkers, 305,500 barrels. Value of these exports was $10,095,500.

This shows total value of exports since the expropriation, March 18, 1938, of $25,557,000.

TABLE 2
Mexican Drilling Activities

AREA	Drilling	Temporarily Suspended	Locations	Total
North Tamaulipas	2	..	..	2
Northern District:				
South Tamaulipas	..	4	1	5
Tampico-Panuco	1	2	..	3
Southern District:				
Main Belt	..	..	1	1
East Flank	..	1	..	1
Poza Rica	3	1	4	8
Isthmus:				
Saline Basin	2	1	14	17
Yucatan	..	1	..	1
Totals	8	10	20	38

TABLE 3
Mexican Production By Districts for Past Seven Years

	Northern	Southern	Poza Rica	Isthmus	Total
1933	12,703,400	11,061,000	803,300	9,311,800	33,879,500
1934	11,885,200	12,815,800	3,746,700	9,577,300	38,005,000
1935	10,358,200	9,946,600	9,492,500	10,271,000	40,068,300
1936	7,871,000	8,453,100	14,173,500	10,320,900	40,818,500
1937	9,805,900	8,292,000	18,634,300	9,957,600	46,689,800
1938	5,344,000	4,229,700	22,021,400	6,684,000	38,279,100
1939	5,609,000	4,638,000	26,042,000	6,373,000	42,662,000

TABLE 4
Monthly Daily Average Production of Mexico's Main Districts

MONTH	Northern	Southern	Poza Rica	Isthmus	Total Barrels
1938:					
January	19,000	18,000	68,500	27,500	133,000
February	23,000	21,500	74,500	24,500	143,500
March	23,000	19,000	64,500	21,500	128,000
April	16,000	11,500	31,000	12,500	71,000
May	15,000	10,000	41,000	14,000	80,000
June	17,000	9,500	46,000	12,500	85,000
July	15,000	9,500	54,500	11,000	90,000
August	14,000	9,500	66,000	15,000	104,500
September	10,000	8,000	74,000	20,000	112,000
October	8,700	7,000	71,000	19,500	106,200
November	8,000	8,300	66,000	20,500	102,800
December	7,000	8,000	67,000	22,200	104,200
1939:					
January	6,300	8,000	55,000	21,000	90,300
February	6,000	8,500	63,500	20,500	98,500
March	7,500	9,000	65,000	17,000	98,500
April	12,000	7,500	66,000	16,500	102,000
May	16,000	8,000	68,000	17,000	109,000
June	16,500	9,500	74,500	16,500	117,000
July	21,000	13,000	80,000	16,000	130,000
August	24,000	20,000	81,500	16,500	142,000
September	23,000	22,500	83,500	17,750	146,750
October	17,750	22,800	89,500	16,500	146,550
November	15,700	12,500	75,000	14,850	118,050
*December	15,000	11,000	55,000	15,000	96,000

* Estimate.

TABLE 5
Completion History of Mexico

FIELD OR AREA	1938			1939			To Jan. 1, 1940		
	Production	Failure	Total	Production	Failure	Total	Production	Failure	Total
Lower California, Chihuahua, Coahuila, Nuevo Leon, North. Tamaulipas, Central Tamaulipas	2	2	4	..	..	..	12	84	96
Northern District	5	11	16	3	5	8	1,617	2,706	4,323
Southern District	2	1	3	..	1	1	586	796	1,382
Poza Rica	2	..	2	5	2	7	29	9	38
Isthmus	3	6	9	6	2	8	352	313	665
Veracruz, Embayment, Oaxaca, Yucatan, Valley of Mexico	..	..	..	..	..	..	..	23	23
Grand Total	14	20	34	14	10	24	2,596	3,931	6,527

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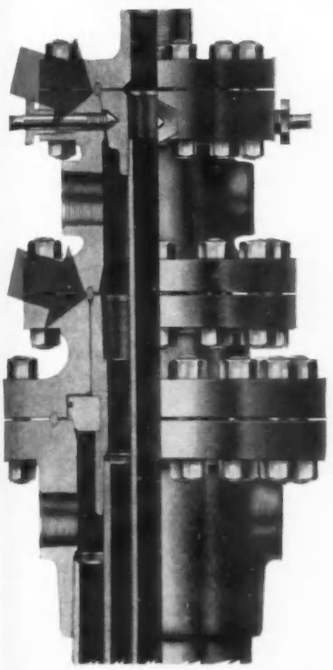
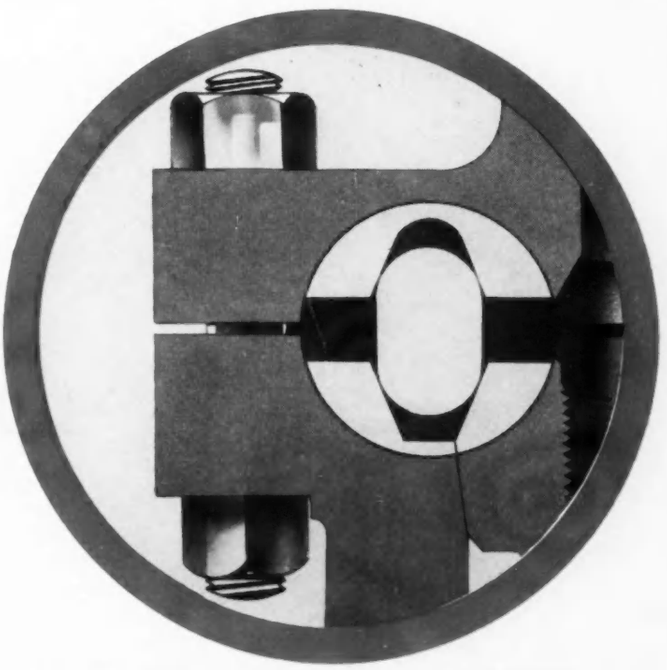
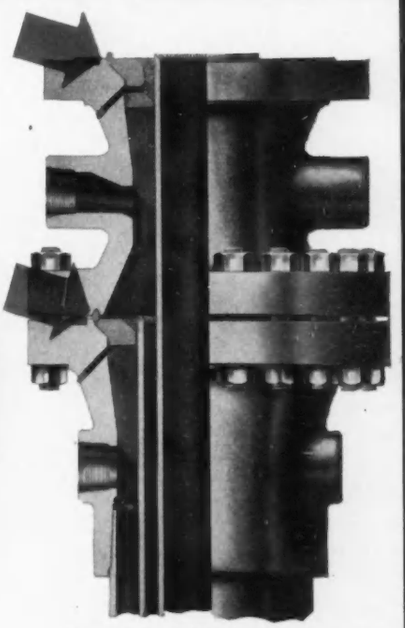


Type FAS RECTORHEAD, with Type 6M Mandrel Suspension Tubing Head.





Type RH RECTORHEAD Slip Type Casing Head. (Hydraulic packing for emergency only.)

NO FABRIC PACKING....

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Rector introduced to the field this patented combination sealing and hold-down arrangement in casing and tubing heads . . . designed it, perfected it, proved its unquestionable advantage over any other means in general use for sealing of pressures, and preventing upward thrust of casing resulting from excessive pressures or expansion of casing due to high temperatures.

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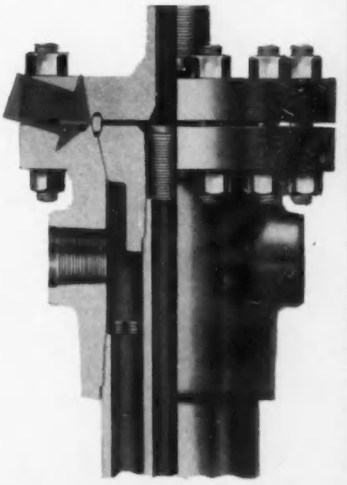
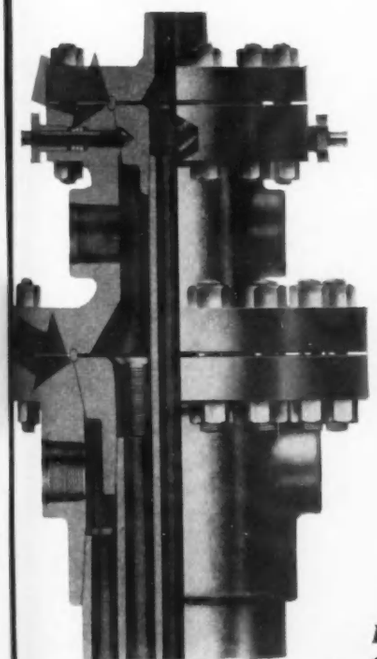


Type 6M Mandrel Suspension Type RECTORHEAD Tubing Head with threaded bottom connection.



Type 6M Mandrel Suspension RECTORHEAD Casing Head and Tubing Head Combination.

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World Crude Oil Production

Complete Production History of World, in Barrels of 42 U. S. Gallons

(Sources.—*Mineral Resources* of the United States, 1918, 1930 and 1931; *Minerals Yearbook*, 1932, 1933 and subsequent years. Note: The figures of *Mineral Resources*, 1918, have been replaced here by figures from later reports, in cases where revisions have been made.)

YEAR	Rumania	United States	Italy	Canada	Russia except Sakhalin	Poland (Galacia)	Japan and Taiwan	Germany	India (British)	Netherland India	Peru	Mexico	Argentina	Trinidad	Egypt	Iran (Persia)
1857	[A]1,977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1858	3,560	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1859	4,349	[A]2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1860	8,542	500,000	[A]36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1861	17,379	2,113,609	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1862	23,198	3,056,690	29	[A]11,775	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1863	27,943	2,611,309	58	82,814	[A]40,816	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1864	33,013	2,116,109	72	90,000	64,586	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1865	39,017	2,497,700	2,265	110,000	66,542	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1866	42,534	3,597,700	992	175,000	83,052	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1867	50,838	3,347,300	791	190,000	119,917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1868	55,369	3,646,117	367	200,000	88,327	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1869	58,533	4,215,000	144	220,000	202,306	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1870	83,765	5,260,745	86	250,000	204,618	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1871	90,030	5,205,234	273	269,397	165,129	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1872	91,251	6,293,194	331	308,100	184,391	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1873	104,036	9,893,786	467	365,052	474,379	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1874	103,177	10,926,945	604	168,807	583,751	[A]149,837	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1875	106,569	8,787,514	813	220,000	697,364	158,522	[A]4,566	.....	.....	.....	.....	.....	.....	.....	.....	.....
1876	111,314	9,132,669	2,891	312,000	1,320,528	164,157	7,708	.....	.....	.....	.....	.....	.....	.....	.....	.....
1877	106,566	13,350,363	3,934	312,000	1,800,720	169,792	9,560	.....	.....	.....	.....	.....	.....	.....	.....	.....
1878	106,300	15,396,868	4,320	312,000	2,400,960	175,420	17,884	.....	.....	.....	.....	.....	.....	.....	.....	.....
1879	110,007	19,914,146	2,891	575,000	2,761,104	214,800	23,457	.....	.....	.....	.....	.....	.....	.....	.....	.....
1880	114,221	26,286,123	2,035	350,000	3,001,200	220,120	25,497	[A]9,310	.....	.....	.....	.....	.....	.....	.....	.....
1881	121,511	27,661,238	1,237	275,000	3,601,441	286,400	16,751	20,219	.....	.....	.....	.....	.....	.....	.....	.....
1882	136,610	30,349,897	1,316	275,000	4,537,815	330,076	15,549	58,025	.....	.....	.....	.....	.....	.....	.....	.....
1883	139,486	23,440,633	1,618	250,000	6,002,401	365,160	20,473	36,708	.....	.....	.....	.....	.....	.....	.....	.....
1884	210,667	24,218,438	2,855	250,000	10,804,577	408,120	27,923	46,161	.....	.....	.....	.....	.....	.....	.....	.....
1885	193,411	21,858,785	1,941	250,000	13,924,596	465,400	29,237	41,360	.....	.....	.....	.....	.....	.....	.....	.....
1886	168,606	28,064,841	1,575	584,061	18,006,407	305,884	37,916	73,864	.....	.....	.....	.....	.....	.....	.....	.....
1887	181,907	28,283,483	1,496	525,655	18,367,781	343,832	28,645	74,284	.....	.....	.....	.....	.....	.....	.....	.....
1888	218,576	27,612,025	1,251	695,203	23,048,787	466,537	37,436	84,782	.....	.....	.....	.....	.....	.....	.....	.....
1889	297,666	35,163,513	1,273	704,690	24,609,407	515,268	52,811	68,217	[A]94,250	.....	.....	.....	.....	.....	.....	.....
1890	383,227	45,823,572	2,998	795,030	28,691,218	659,012	51,420	108,296	118,065	.....	.....	.....	.....	.....	.....	.....
1891	488,201	54,292,655	2,305	755,298	34,573,181	630,730	52,917	108,929	190,121	.....	.....	.....	.....	.....	.....	.....
1892	562,178	50,514,657	18,321	779,753	35,774,504	646,220	68,901	101,404	242,284	.....	.....	.....	.....	.....	.....	.....
1893	535,655	48,431,066	10,089	798,406	40,456,519	692,669	106,384	99,390	298,999	[A]800,000	.....	.....	.....	.....	.....	.....
1894	507,255	49,344,516	20,553	829,104	36,373,428	940,146	[B]173,000	122,564	327,218	688,170	.....	.....	.....	.....	.....	.....
1895	575,200	52,892,276	25,843	726,138	46,140,174	1,452,999	170,000	121,277	371,536	1,215,757	.....	.....	.....	.....	.....	.....
1896	543,348	60,960,361	18,149	726,822	47,220,633	2,443,080	237,000	145,061	429,979	1,427,132	[A]47,536	.....	.....	.....	.....	.....
1897	570,886	60,475,516	13,892	709,857	54,399,568	2,226,368	262,000	165,745	545,704	2,551,649	70,831	.....	.....	.....	.....	.....
1898	776,238	55,364,233	14,489	758,391	61,609,357	2,376,108	319,000	183,427	542,110	2,964,035	70,905	.....	.....	.....	.....	.....
1899	1,425,777	57,070,850	16,121	808,570	65,954,968	2,313,047	539,000	192,232	940,971	1,795,961	89,166	.....	.....	.....	.....	.....
1900	1,628,535	63,620,529	12,102	913,498	75,779,417	2,346,505	871,000	358,397	1,078,364	2,253,355	274,800	.....	.....	.....	.....	.....
1901	1,678,320	69,389,194	16,150	756,579	85,168,556	3,351,544	1,117,000	313,630	1,490,716	4,013,710	274,800	[A]10,345	.....	.....	.....	.....
1902	2,059,935	88,766,916	18,933	830,624	80,540,044	4,142,159	996,000	353,674	1,617,363	2,430,465	286,725	40,200	.....	.....	.....	.....
1903	2,763,117	100,461,337	17,876	486,637	75,591,256	5,234,475	1,209,000	445,818	2,510,259	5,770,056	278,092	75,375	.....	.....	.....	.....
1904	2,599,026	117,080,960	25,476	552,575	78,536,655	5,947,383	1,219,000	637,431	2,385,468	6,508,485	[B]290,000	125,625	.....	.....	.....	.....
1905	4,420,997	134,717,580	44,027	634,095	84,960,270	5,765,217	1,347,000	560,963	4,137,098	7,849,896	373,000	251,250	.....	.....	.....	.....
1906	6,378,184	126,493,936	53,577	569,753	58,897,311	5,467,967	1,564,000	578,610	4,015,803	8,180,657	531,000	502,500	.....	.....	.....	.....
1907	8,118,207	166,095,335	89,875	788,872	61,850,734	8,455,841	1,718,000	756,631	4,344,162	9,982,597	751,000	1,005,000	[A]101	.....	.....	.....
1908	8,252,157	178,527,355	50,966	527,987	62,186,447	12,612,295	1,871,000	1,009,278	5,047,038	10,283,357	945,000	3,932,900	11,472	[A]169	.....	.....
1909	9,327,278	183,170,874	42,388	420,755	65,970,350	14,932,799	1,887,000	1,018,837	6,676,517	11,041,852	1,411,000	2,713,500	18,431	57,143	.....	.....
1910	9,725,800	209,557,348	50,830	515,895	70,336,574	12,673,688	1,829,000	1,032,522	6,137,990	11,070,620	1,258,000	3,634,080	20,753	142,857	.....	.....
1911	11,107,450	220,449,391	74,709	291,096	66,183,691	10,519,270	1,737,000	1,017,045	6,451,203	12,172,949	1,465,000	12,552,798	13,119	285,307	[B]21,000	.....
1912	12,976,232	222,935,044	53,778	243,336	68,019,208	8,535,174	1,659,000	1,031,050	7,116,672	10,845,624	1,752,000	16,558,215	47,007	436,805	214,000	.....
1913	13,554,768	248,446,230	47,198	228,080	62,834,356	7,818,130	1,940,000	[B]857,000	7,930,149	11,172,294	2,071,000	25,696,291	130,618	503,616	98,000	[B]1,857,000
1914	12,826,579	265,762,535	39,849	214,805	67,020,522	[B]6,436,000	2,636,000	781,000	7,409,792	[A]11,422,000	1,837,000	26,235,403	275,500	643,533	753,000	2,910,000
1915	12,029,913	281,104,104	43,898	215,464	68,548,062	5,352,000	2,928,000	703,000	8,202,674	11,920,000	2,579,000	32,910,508	[B]513,000	750,000	212,000	3,616,000
1916	8,945,029	300,767,158	50,585	198,123	[B]65,817,000	6,587,000	2,963,000	656,000	8,491,137	12,547,000	2,593,000	39,817,402	867,000	928,581	404,000	4,477,000
1917	3,720,760	335,315,601	40,763	213,832	63,072,000	6,228,000	2,861,000	642,000	8,078,843	13,180,000	2,577,000	55,292,770	1,218,000	1,602,312	943,000	7,147,000
1918	[B]8,730,000	355,927,716	[B]35,000	304,741	27,168,000	6,032,000	2,441,000	270,000	[B]8,188,000	12,778,000	2,527,000	[B]63,828,000	1,353,000	2,063,068	1,925,000	8,623,000
1919	6,618,000	[B]378,367,000	35,000	[B]241,000	31,752,000	6,096,000	2,238,000	265,000	8,736,000	15,508,000	2,628,000	87,073,000	1,331,000	[B]1,841,000	1,517,000	10,139,000
1920	7,435,000	442,929,000	35,000	196,000	25,430,000	5,607,000	2,221,000	246,000	8,375,000	17,529,000	2,817,000	157,069,000	1,651,000	2,063,000	1,042,000	12,230,000
1921	8,368,000	472,183,000	32,000	188,000	28,968,000	5,167,000	2,233,000	274,000	8,734,000	16,958,000	3,699,000	193,398,000	2,036,000	2,354,000	1,255,000	16,673,000
1922	9,843,000	557,531,000	31,000	179,000	35,692,000	5,227,000	2,055,000	319,000	8,529,000	17,066,000	5,314,000	182,278,000	2,866,000	2,445,000	1,188,000	22,247,000
1923	10,867,000	732,407,000	34,000	170,000	39,147,000	5,402,000	1,804,000	346,000	8,406,000	19,870,000	5,699,000	149,585,000	3,400,000	3,051,000	1,054,000	25,230,000
1924	13,369,000	713,940,000	39,000	161,000	45,355,000	5,657,000	1,814,000	406,000	8,416,000	20,473,000	8,379,000	139,678,000	4,639,000	4,057,000	1,122,000	32,373,000
1925	16,650,000	763,743,000	61,000	332,000	52,448,000	5,960,000	1,915,000	541,000	8,274,000	21,422,000	9,233,000	115,515,000	6,336,000	4,387,000	1,226,000	35,038,000
1926	23,314,000	770,874,000	41,000	364,000	64,311,000	5,844,000	1,785,000	653,000	8,011,000	21,343,000	10,762,000	90,421,000	7,851,000	4,971,000	1,188,000	38,842,000
1927	26,368,000	901,129,000	47,000	477,000	77,018,000	5,342,000	1,789,000	663,000	8,032,000	27,459,000	10,127,000	64,121,000	8,630,000	5,380,000	1,367,000	39,688,000
1928	30,773,000	901,474,000	46,000	634,000	[B]84,745,000	5,492,000	1,944,000	630,000	8,741,000	32,118,000	12,006,000	50,151,000	9,070,000	7,684,000	1,842,000	43,461,000
1929	34,758,000	1,007,323,000	45,000	1,117,000	[B]99,507,000	4,988,000	2,023,000	704,000	8,747,000	39,279,000	13,422,000	44,688,000	9,391,000	8,716,000	1,868,000	42,145,000
1930	42,759,000	898,011,000	59,000	1,522,000	[B]125,555,000	4,904,000	2,047,000	1,222,000	8,887,000	41,729,000	12,449,000	39,530,000	9,002,000	9,419,000	1,996,000	45,833,000
1931	49,741,000	851,081,000	124,000	1,543,000	162,842,000	4,662,000	1,966,000	1,608,000	8,715,000	35,539,000	10,089,000	33,039,000	11,709,000	9,744,000	2,038,000	44,376,000
1932	53,815,000	785,156,000	208,000	1,044,000	154,367,000	4,116,000	1,630,000	1,608,000	8,817,000	39,001,000	9,899,000	32,805,000	13,139,000	10,126,000	1,895,000	49,471 000
1933	54,020,000	905,856,000	204,000	1,145,000	153,352,000	4,072,000	1,455,000	1,665,000	8,743,000	42,667,000	13,257,000	34,001,000	13,091,000	9,561,000	1,663,000	54,392,000
1934	62,438,000	908,065,000	150,000	1,411,000	174,986,000	3,913,000	1,321,000	2,187,000	9,201,000	46,529,000	16,314,000	38,172,000	14,025,000	10,894,000	1,546,000	57,851,000
1935	61,773,000	996,596,000	119,000	1,447,000	182,386,000	3,812,000	2,249,000	2,990,000	9,219,000	47,171,000	17,067,000	40,241,000	14,297,000	11,671,000	1,301,000	57,273,000
1936	64,185,000	1,099,687,000	123,000	1,500,000	199,055,000	3,788,000	2,440,000	3,115,000	9,566,000	50,025,000	17,593,000	41,028,000	15,458,000	13,237,000	1,278,000	62,718,000
1937	52,709,000	1,279,160,000	110,000	2,944,000	195,155,000	3,716,000	2,488,000	3,176,000	10,010,000	56,724,000	17,457,000	46,907,000	16,355,000	15,503,000	1,196,000	77,877,000
1938	48,366,000	1,214,355,000	101,000	6,956,000	202,290,000	3,763,000	2,557,000	4,074,000	8,992,000	57,481,000	15,839,000	34,794,000	16,937,000	17,736,000	1,561,000	77,230,000
1939[C]	45,997,000	1,264,256,000	91,000	7,849,000	212,975,000	3,920,000	2,648,000	4,557,000	9,560,000	61,293,000	13,677,000	40,778,000	18,256,000	19,392,000	4,448,000	79,815,000
Total	875,577,176	22,452,497,719	2,707,718	55,835,770	4,194,204,907	258,923,251	80,250,035	46,138,041	291,061,365	913,709,621	252,078,855	1,940,454,162	204,538,001	181,684,391	38,071,000	950,532,000

[A] Actual numbers of barrels are shown prior to 1918, as reported in *Mineral Resources*, 1918; except in cases where revisions have been made in later reports, with such revisions being in thousands of barrels.

[B] Figures beginning with this year are shown in nearest thousand barrels, being from *Mineral Resources* of 1930, and 1931; and from *Minerals Yearbook* in subsequent years.

[C] Production of France in previous years credited to Germany.

By Countries and By Years

Complete Production History of World, in Barrels of 42 U. S. Gallons

(Sources.—*Mineral Resources* of the United States, 1918, 1930 and 1931; *Minerals Yearbook*, 1932, 1933 and subsequent years. Note: The figures of *Mineral Resources*, 1918, have been replaced here by figures from later reports, in cases where revisions have been made.)

YEAR	British Borneo (Sarawak And Brunei)	Algeria	Ecuador	Venezuela	France	England	Czecho-slovakia	Sakhalin	Colombia	Iraq	Bolivia	Bahrein Island	Albania	Austria	Australia and New Zealand	Saudi Arabia	Hungary	Other Countries	Total World	Percent Produced by U.S.
1857	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,077	.....
1858	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,580	.....
1859	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,349	31
1860	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	508,578	98
1861	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,130,917	99
1862	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,091,692	99
1863	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,762,940	94
1864	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,308,780	92
1865	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,715,824	92
1866	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,399,278	93
1867	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,708,846	90
1868	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,990,180	91
1869	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,695,985	90
1870	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,792,214	91
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,730,063	91
1872	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,877,267	92
1873	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,837,720	91
1874	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,933,121	92
1875	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,977,349	88
1876	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,051,267	83
1877	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,753,938	85
1878	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18,416,761	84
1879	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23,601,406	84
1880	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,017,606	88
1881	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31,992,797	88
1882	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35,704,288	85
1883	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,355,479	78
1884	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35,968,741	67
1885	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36,764,730	59
1886	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47,243,154	59
1887	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47,807,083	59
1888	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52,164,567	53
1889	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	51,507,095	57
1890	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76,632,838	60
1891	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91,100,347	60
1892	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88,739,219	57
1893	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92,038,127	53
1894	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89,336,953	55
1895	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103,601,200	51
1896	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	114,199,101	53
1897	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	121,992,016	50
1898	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	134,978,393	44
1899	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	131,146,563	44
1900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	149,136,302	43
1901	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	167,440,644	41
1902	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26,000	181,909,038	49
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36,000	194,879,298	52
1904	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,000	217,948,084	54
1905	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	215,091,483	63
1906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	213,263,298	59
1907	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	263,956,355	63
1908	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	285,287,421	63
1909	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	298,708,734	61
1910	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	327,763,863	64
1911	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	344,361,028	64
1912	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	352,443,145	63
1913	[D]141,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	385,345,730	64
1914	318,000	[D]1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	407,542,518	65
1915	302,000	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000	432,033,623	65
1916	629,000	8,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000	456,771,015	66
1917	542,000	9,000	[D]57,000	[D]120,000	[G]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29,000	502,889,881	67
1918	504,000	7,000	[D]60,000	333,000	[D]363,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000	503,514,535	71
1919	596,000	5,000	[D]60,000	425,000	334,000	[P]2,000	[D]48,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	555,875,000	68
1920	1,020,000	4,000	[D]60,000	457,000	356,000	3,000	69,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	688,884,000	64
1921	1,411,000	3,000	[D]60,000	1,433,000	389,000	3,000	94,000	[D]2,000	[D]67,000	.....	.....	.....	.....	.....	.....	.....	.....	20,000	766,002,000	62
1922	2,849,000	9,000	[D]60,000	2,201,000	496,000	1,000	120,000	7,000	323,000	.....	.....	.....	.....	.....	.....	.....	.....	22,000	858,896,000	65
1923	3,940,000	9,000	87,000	4,201,000	494,000	1,000	74,000	9,000	425,000	.....	.....	.....	.....	.....	.....	.....	.....	24,000	1,015,736,000	72
1924	4,163,000	11,000	[D]100,000	9,042,000	497,000	2,000	76,000	80,000	445,000	.....	.....	.....	.....	.....	.....	.....	.....	24,000	1,014,318,000	70
1925	4,257,000	12,000	160,000	19,687,000	459,000	3,000	158,000	87,000	1,007,000	.....	.....	.....	.....	.....	.....	.....	.....	23,000	1,068,933,000	71
1926	4,942,000	9,000	214,000	36,911,000	478,000	2,000	150,000	181,000	6,444,000	.....	.....	.....	.....	.....	.....	.....	.....	17,000	1,066,823,000	70
1927	4,943,000	8,000	537,000	63,134,000	504,000	2,000	112,000	440,000	15,014,000	[D]338,000	.....	.....	.....	.....	.....	.....	.....	13,000	1,262,582,000	71
1928	[G]5,223,000	8,000	1,084,000	105,749,000	512,000	1,000	94,000	677,000	19,807,000	713,000	.....	.....	.....	.....	.....	.....	.....	15,000	1,324,774,000	68
1929	5,290,000	20,000	1,281,000	137,472,000	535,000	D	93,000	[E]1,134,000	20,285,000	798,000	[E]	.....	.....	.....	.....	.....	.....	38,000	1,485,867,000	68
1930	4,907,000	16,000	1,553,000	136,660,000	523,000	[E]	157,000	[E]1,805,000	20,346,000	909,000	[E]54,000	.....	.....	.....	.....	.....	.....	40,000	1,411,905,000	64
1931	3,854,000	D	1,762,000	116,613,000	527,000	D	134,000	2,734,000	18,237,000	900,000	25,000	.....	.....	.....	.....	.....	.....	54,000	1,373,656,000	62
1932	3,796,000	D	1,597,000	116,541,000	530,000	D	126,000	2,631,000	16,414,000	836,000	44,000	.....	.....	.....	.....	.....	.....	62,000	1,309,677,000	60
1933	4,490,000	D	1,620,000	117,720,000	562,000	D	122,000	2,630,000	13,158,000	917,000	112,000	31,000	11,000	6,000	9,000	.....	.....	38,000	1,441,000,000	62.6
1934	5,140,000	D	1,637,000	136,103,000	557,090	D	178,000	2,798,000	17,341,000	7,689,000	159,000	285,000	10,000	28,000	5,000	.....	.....	41,000	1,521,474,000	59.7
1935	5,546,000	D	1,732,000	148,354,000	541,000	D	133,000	2,545,000	17,598,000	27,406,000	164,000	1,265,000	41,000	44,000	5,000	.....	.....	57,000	1,654,961,000	60.2
1936	5,209,000	D	1,951,000	154,794,000	503,000	D	127,000	3,212,000	18,756,000	30,406,000	105,000	4,645,000	273,000	50,000	5,000	20,000	.....	70,000	1,804,925,000	60.9
1937	6,009,000	D	2,161,000	186,775,000	502,000	D	122,000	3,656,000	20,298,000	31,336,000	122,000	7,762,000	619,000	221,000	4,000	65,000	16,000	60,000	2,041,715,000	62.7
1938	7,012,000	D	2,246,000	187,369,000	515,000	D	132,000	[E]3,900,000	22,450,000	32,643,000	107,000	8,298,000	489,000	366,000	4,000	495,000	318,000	64,000	1,979,461,000	61.3
1939[J]	7,214,000	D	2,305,000	207,055,000	502,000	D	121,000	4,000,000	22,001,000	31,165,000	100,000	7,788,000	1,386,000	745,000	4,000	4,244,000	771,000	580,000	2,079,493,000	60.8
Total	94,237,000	143,000	22,484,000	1,889,058,000	10,680,000	20,000	2,440,000	32,528,000	250,606,000	166,558,000	994,000	30,074,000	2,829,000	1,460,000	36,000	4,824,000	1,105,000	1,753,000	35,250,193,012	63.7

[D] No more data available.

[E] Year ended September 30.

[P] Estimated.

[G] Beginning of production from Brunei.

[H] Less than one thousand barrels.

[I] Approximate.

[J] For 1939, figures for countries outside the United States are preliminary, having been estimated by THE OIL WEEKLY.

Respect of Customs

[*Continued from page 62*]

efficiency requires intimate and detailed training, proper tools and long experience. All of these require abundant capital supplied by strong groups which can afford failure.

It is not a disparaging remark to state that the nations to the south of us do not have these things which are essential to the economic development of petroleum resources, any more than it is detrimental to our national character to state that we are not proficient in the development or manufacture of something with which we have had no experience.

In the development of their natural resources these southern countries are practically virgin territories, as was this country a few generations ago. At that time it was essential that foreign capital come to our aid in supplying us with the financial resources necessary to the development of every phase of industrial life of the nation. We would all undoubtedly be astounded were we familiar with the part played by foreign capital in the United States prior to 25 years ago. Now, for many and sundry reasons, the various developments of foreign capital have come into American hands through purchase of the securities controlling them, or naturalization of the original owners. The same can happen in other countries.

Expropriation Ill-Advised

Unfortunately, and without question ill-advisedly, certain Latin American countries have expropriated, or confiscated, as you will, producing and other properties from their foreign owners. This is unquestionably highly detrimental to both.

Our sister republics of this hemisphere industrially are new countries, as were we a few generations past. They need capital and engineering skill as did we. Without these their natural resources, which compose the primary wealth of any nation, cannot be developed. Therefore, action on the part of the national governments of the various countries that discourages the entrance of foreign capital or foreign technicians is detrimental to the welfare of those countries.

At the same time, the nation granting a concession has the right and duty to demand and require a fair part of the resource which is to be developed and won.

In many instances experienced foreigners have taken undue advantage of the inexperience of a given people and have acquired grants and concessions that gave them unfair advantages. There is also a tendency among foreign concessionnaires to endeavor to have the laws of a nation changed to suit their conception of propriety and justice. Such practices are to be condemned and do not evidence proper respect for the rights of others.

It is true that in many cases laws are such that it is economically impracticable to operate under them. In that event then, it should remain with the nation in question whether the alteration of its laws to fit the economy of the given problem is justified by the benefits to be gained thereby.

"When in Rome"

But in principle, with which we are primarily concerned here, there should be fullest respect for the laws of the countries in which we are permitted to labor, and if they are not suitable to the requirements of the general circumstances we should refrain from investments and operations in them and should not through various and sundry means endeavor to alter the laws of a people to conform to the ideas and selfish desires of a foreign individual.

Certain of the nations have set aside their petroleum reserves for the benefit of the nation and their nationals exclusively. In the two cases with which I am familiar the new laws in no way disturb foreign operators without full and due compensation. These two nations are financially capable of carrying out prospecting and are using foreign technicians for the original explorations and to train their nationals. From a given country's standpoint, this is probably the ideal method by which to operate its properties, and certainly a fair and reasonable one where other nationals are concerned. There seems to be no point for criticism in this policy, and where a nation subscribes to it and is capable financially and otherwise of pursuing it in accordance with good development and operating practices, it is unquestionably substantially to be preferred over any other system.

At present most of our business in Latin American countries is done under an arrangement where the operating corporations are foreign to the particular country. But in Chile and Brazil the entire development is promoted by the governments and nationals of those two countries, and in the Argentine and Peru there are operating companies owned and controlled by the governments. In Mexico the government still holds and operates the properties that are owned by foreign corporations.

Outlook Good

Thus, we are beginning to have business with the nationals of those various countries. We may expect that in the future we shall have still more business with them.

The nations south of the Rio Grande are largely populated with the various Indians of the pre-Columbus time. For two or three hundred years after the discovery of North and South America large numbers of Spanish-speaking people made their way to what are now the various Spanish-speaking countries. During the same period the Portuguese settled in Brazil. The blood of these peoples, though different, was equal to the blood of the peoples from which we are descended. They are as honorable, cultured and trustworthy, as were our ancestors, though generally of different ideas and in many cases of different ideals. The same condition obtains today; the peoples in these Latin American countries with whom we come in contact are a fine, upstanding, honorable, cultured people whose customs of life and ideals, except in truthfulness and honesty, are somewhat different from our own. They are fully equal in culture to the American people, and in many cases, superior.

Better Understanding Needed

Because of the difference in customs, temperament and speech, probably we do not display just exactly the consideration that we always should. Not because we do not respect them, but because we do not understand them.

It is encumbent upon us, and in fact essential, that we endeavor to understand, appreciate and sympathize with the splendid peoples of these nations. If we go into their countries, then we should do them the courtesy to follow the customs that are prescribed for their own country.

hen you say COMPLETED"

be sure you're right

Set THE LAYNE SCREEN and PACKER

A screen that won't sand-up and a packer that stays put . . . that's the way every operator wants to "Complete" a well. For this kind of job you need a Layne Wire Wrapped Screen and the Layne Packer.

The slightly wedge shaped opening on Layne Wire Wrapped Screen, flared toward the pipe, provides a freer passageway for the fluid, eliminates clogging and reduces sand cutting. The wire is wrapped directly onto the pipe, under pressure, assuring uniform gauge openings. The absence of space between wire and pipe assures a more thorough cleaning job.

Forty-two inches of canvas compressed to 20" of almost iron hardness gives a pack that needs neither fingers nor slips to prevent creeping up when exposed to high pressures. The Layne Improved Ratchet Packer has internal ratchet or buttress threads on the sleeve just above the canvas wrapping and the stem has external ratchet threads full length of the canvas wrapping. When the sleeve is forced down, the canvas is expanded and held in place by the ratchet threads.

Setting the Layne Improved Ratchet Packer with the Screw Thru Setting Tool is about the simplest and most fool-proof job in the world. You cannot fail to release setting tool from packer before attempting to set packer.

"Complete" your wells so they stay "completed" longer—Set the LAYNE SCREEN AND PACKER.

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- Saves on RIGGING-UP TIME
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- Saves on FUEL

SPECIFICATIONS

CONTROLS: Centrally located. Clutches foot controlled.

MAST: Special alloy cold drawn seamless steel tubing, electric welded. 60 feet with large folding pipe rack, 4 wire line sheaves and one cathead sheave. Raised and lowered with two telescoping hydraulic cylinders.

DRAW WORKS FRAME: Electric welded into one piece to insure rigidity. Completely enclosed with guard.

DRIVE: Direct from motor to gear box with heavy duty universal joint shaft.

GEAR BOX: Alloy steel case. Heat treated steel gears and Timken bearings.

CLUTCHES: Heavy duty, multiple disc, friction clutch for rotary table drive and internal expanding shoe type clutch hoisting drum.

DRUM: 32" flanges, 25" between flanges. Mounted on ball bearing to insure free spooling. Drum shaft diameter 5". Mounted on self-aligning spherical roller bearings.

DRUM DRIVE: 1½" double roller chain.

BRAKES: Two 8" bands with 90% contact. Equalized, cam actuated, self-energizing, non-kicking.

JACKSHAFT: 3⅝" diameter heat treated Chrome Molybdenum steel, mounted on self-aligning spherical roller bearings.

CATHEAD SHAFT: 3⅝" diameter heat treated Chrome Molybdenum steel, mounted on self-aligning spherical roller bearings.

CATHEADS: One plain. One American Simplomatic.

ROTARY TABLE: 12¾" oil bath. Ball thrust bearing and tapered roller bearings on pinion shaft. Spiral cut, heat treated steel bevel gears and alloy steel castings.

ROTARY TABLE DRIVE: 2½" shaft through heavy duty universal joints.

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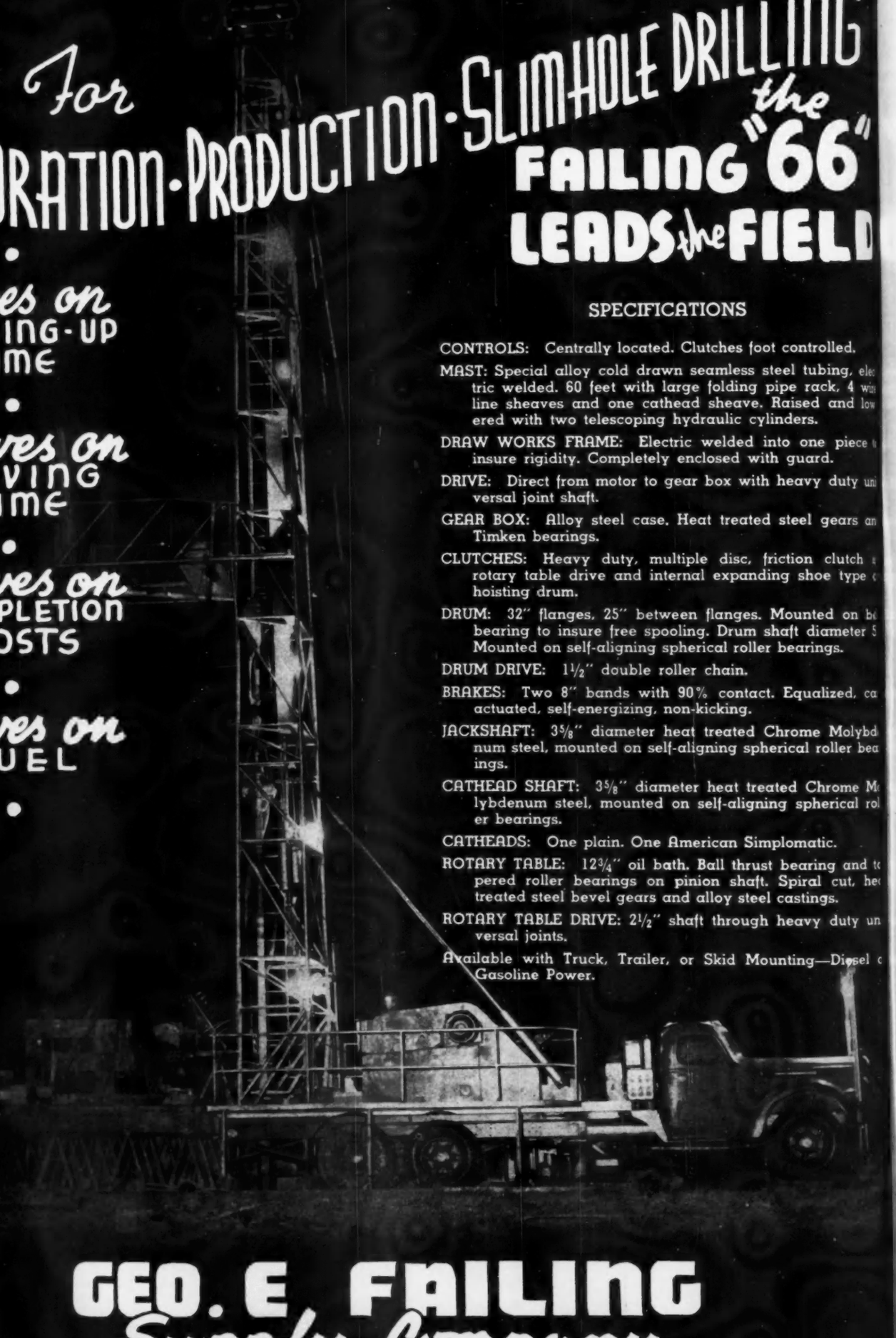

GEO. E. FAILING Supply Company

ENID - OKLA HOUSTON TEXAS

"Cores Will Tell"

Economic Shadows Have Not Obscured Bright Spots In International Oil

[*Continued from page 46*]

ital, and is doing much to encourage development of oil within its borders. One small oil field has been found near Bahia, along the coast, and a second oil field is indicated near Maceio, also near the Atlantic coast.

"Bahia field produces from Cretaceous sediments at a depth of only 1300 feet, the valley somewhat resembling the Los Angeles basin from a surface standpoint. Deeper production also is a possibility.

"More than 250 feet of oil sand has been logged in the first well drilled in the Maceio district, the saturated strata having been encountered at various levels between 2500 and 5000 feet. The best sand section was 50 feet thick. A second well is being drilled nearby.

"There are any number of promising valleys along the coast line that may prove productive, the sediments being favorable to oil accumulation at various depths."

Drilling & Exploration Company has carried out the field work in both the Bahia and Maceio districts.

Two rotaries and a cable tool rig are wildcatting in the State of Bahia; another rotary is exploring in the state of Alagoas. Other drilling equipment is slated to be employed in the Territory of Acre.

Ecuador-Bolivia-Chile

Concession acquisition by reliable parties assures continuance of wildcatting in Ecuador during 1940. Nine rigs were running there as the year opened, and if the new deep production found last year northeast of Ancon Peninsula fields lives up to expectation, the number of active rigs may be increased.

Bolivian fields, now operated by the government following their confiscation from Standard Oil Company of Bolivia, are promised an increase in activity during 1940 in line with the government's announced intention of increasing production, particularly in Sanandita.

The chief engineer of the department of mines and petroleum at Punta Arenas, writes that wildcatting continued at three locations in Chile during 1939 without discovery of a paying oil field, although some showings were recorded. Drilling will continue in Chile on a modest scale during 1940.

Europe

Rumania, second most important producing country in Europe, looms as the country which will probably drill the next most footage there during 1940, war permitting, even though the drilling trend looks like it will be down. Official figures showed 150 completions and a total of 855,000 feet drilled in Rumania during 1939. The price incentive for increased drilling in Rumania is blocked by the disadvantage of being in the immediate war zone and the handicaps imposed on routine and wildcat development by blocked currency and unsatisfactory petroleum laws. One of Rumania's prime obstacles to increased drilling is lack of ability to obtain American drilling equipment, a situation which is said to be easing somewhat.

Germany

Exploratory efforts in Germany, subsidized by the Reich for the past few years, are being pushed to the limit. With all the progress made there in synthetic production of motor fuels and lubricants, the country still is woefully shy of petroleum products, or their substitutes. Drilling in proven fields has been speeded up, and as long as the war lasts not a whole lot of attention will be given to such things as wide well spacing in Germany. This nation has numerous undrilled prospects, and military needs are accelerating their development.

England will continue exploratory and development work on a small scale during 1940, but there is nothing to indicate more than a few completions for the year. The same holds true for France. Bulgaria had planned on a certain amount of wildcatting, but the war may divert attention of Sofia money to other lines of more immediate promise.

Egypt

From the wildcatter's point of view Egypt is potentially the big play of tomorrow in this section of the world. Literally millions of acres of leases have been taken since discovery of flush oil at Ras Gharib by Anglo Egyptian Oilfields, Limited. Several of the largest oil companies in the world are active in the play with lease acquisition and exploratory tests. Egypt is getting the greatest fling at oil prospecting any country in Africa has ever had. If there is anything to the law of averages, something new should be found there in the next two or three years. Egypt's production increased over three-fold in 1939.

The status quo in other parts of Africa and in Italy is just about as it was at the beginning of 1938, nothing new having been found in any of the wildcats drilled, nothing startling in the way of a serious prospecting campaign having been announced.

Iran and Iraq

Because of military censorship, two exceedingly important sections of the oil producing world have been out of the picture for some months so far as news of developments are concerned. These are Iran and Iraq, both controlled by interests sympathetic with France and England. That Iran's reserves have been appreciably increased was attested by beginning construction of a 12-inch line to connect the new Gach Saran field in Southern Iran to the Abadan refinery and also by construction of a new refinery at Bandar Shapur.

Unconfirmed reports credit Iraq Petroleum Company with considerable field and wildcat drilling during 1939. Exploratory work on the Basrah, Mosul, British Oil Development concessions continues. A wildcat near Kaleann is rumored to have found 38-gravity oil at 9082 feet, while another at Ain Zalla is said to have established 32-gravity production.

Opinion seems to be that both Iraq and Iran production are strictly market controlled factors and that the output of either country could be increased by the turning of valves if the price obtained for the oil so warranted in the opinion of the governments and companies involved.

Turkey to Drill

Turkey cannot answer the roll call of oil producing countries yet,

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but wildcatting will continue there during 1940, with exploratory drilling going on in several spots simultaneously under direction of an American-trained petroleum engineer and geologist. Rotary and two types of cable tools are used in the drilling. Those in charge have come to the conclusion, as have others in a number of foreign countries, that modern exploration properly done calls for deeper drilling and heavier equipment.

Albania, which furnishes most of the oil produced under Italian ownership, is slated to try to increase the 2500-barrel daily yield from its major field. Data on 1939 field work is not available, but Il Duce smarts as strongly under shortage of crude as does Hitler, so Albanian drilling will continue apace as long as field locations are available.

India

Developments in Dhulian field, where about 10 wells have been completed, have directed operations in India toward deeper drilling in proven fields. Drilling was called for following completion of geophysical and geological work on an Assam structure covered by the Tiru Hills. Preliminary exploratory work is progressing in the Assam Valley. Deep drilling is being resorted to at Masimpur, while Sitakund concession is reported undergoing core drilling. Indian Oil Concessions, Limited, is working on a 16,000-square mile concession covering the state of Bahawalpur, Punjab, while Burmah Oil Company is active on two concessions in the states of Khairpur and Tripura.

Japan

Japan's trend in exploratory work is toward deeper drilling. It is boring at about 8000 feet on a 13,850-foot objective in Kinsui field, where Nippon Oil Company drilled No. 32 to 13,150 feet in 1938. Imo 96, deep test in Nishiyama field, is drilling below 10,560 feet toward a 12,000-foot objective. Both have logged production possibilities at higher levels. The government has clamped down on issuance of drilling and production statistics, so that data are not available. But it is safe to predict that Japan, having gotten a taste of the rewards of deeper drilling and wildcatting, will have a larger oil industry tomorrow.

DRILLING CONTRACTORS' NOTEBOOK

Helpful Suggestions For Those Interested In Drilling Methods

Operating Ideas Maintenance Hints New Rig Hook-ups

Published as a regular feature of THE OIL WEEKLY

1. RIGGING UP

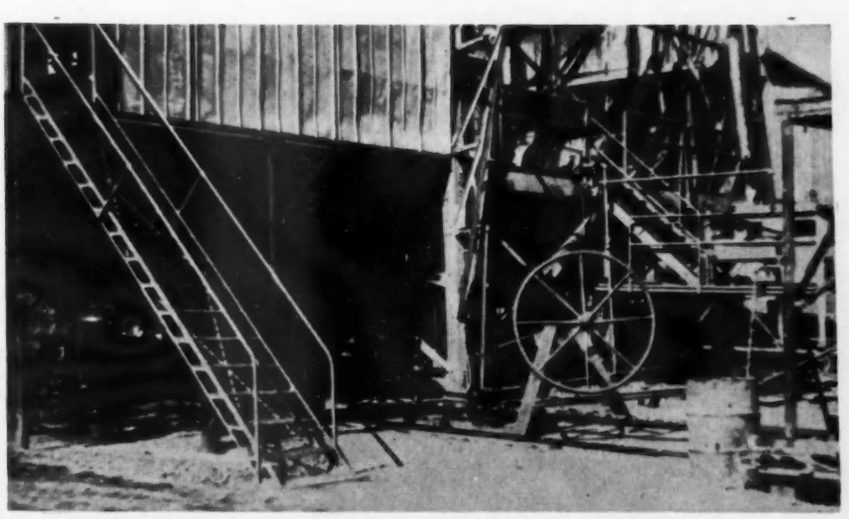
Elevating Floor Supplies Additional Space for Deep-Drilling Equipment

THE industry's trend toward drilling has brought many changes in practices and equipment. In the San Joaquin Valley of California, where several fields are producing from between 10,000 and 13,000 feet, the height of the derrick floor has been raised by some companies.

Until last fall, the average derrick floor was 8½ feet above the ground. Several companies are now constructing them 12 feet above the ground. This change was first made by Superior Oil Company, and is now being used by Amerada Petroleum Corporation and Standard Oil Company of California in the Wasco and Rio Bravo fields.

With deeper drilling, larger equipment and more massive controls are necessary. Raising the derrick floor provides the necessary enlarged space that they require, and still makes them easily accessible.

Further elevating of the derrick floor also provides better mud ditch flow, and permits some of the usual rig floor equipment to be placed beneath it, giving greater working space.



The derrick platform raised 12 feet above the ground provides needed space for the larger controls necessary in deep drilling and permits placement of some of the usual rig floor equipment beneath the floor.

2. SAFETY

Messages Attached To Pay Checks

ARROW DRILLING COMPANY takes a safety message from the office to the drilling crew on the rig by attaching a 3x5-inch card illustrating a safety measure to the employe's pay check. Reaching the employe in a favorable mood, the message is carefully read. The plan has proved more effective than placing a safety bulletin in a field office.

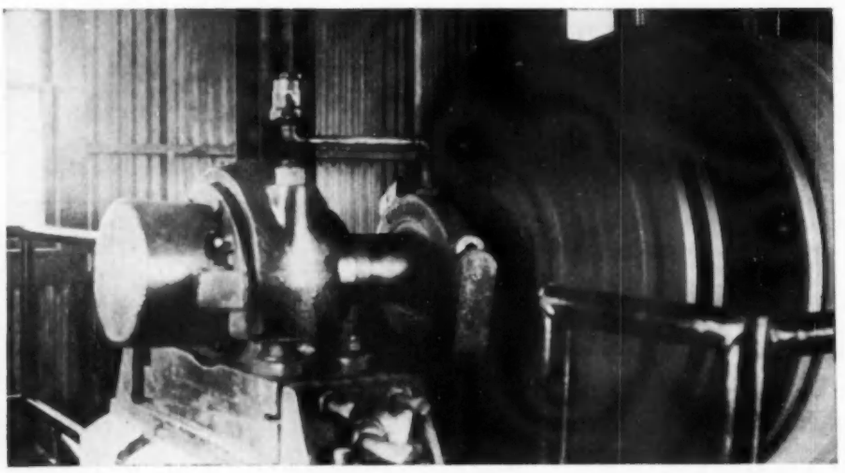
Safety messages such as the above, mimeographed on 3x5-inch cards, reach field employes attached to their checks.

Texts of the message are timed with the seasons, stressing, for example, precautions to be taken during high winds in March, excessive heat in the summer or ice in the winter.

3. LUBRICATION

Extended Grease Cup Minimizes Danger

TO safeguard employes when lubricating rapidly rotating parts, such as clutch yokes, the spring loaded grease cup may be set out over the clutch shaft pillow block bearing housing by using several ¼-inch pipe nipples and fittings. The nipple replacing the grease cup should be of sufficient length



Quarter-inch pipe nipples and fittings extend this grease cup away from the rapidly rotating clutch yoke out over the clutch shaft pillow block bearing housing.

that, when the "L" and longer nipple are installed, the grease-cup will be a sufficient distance above the pillow-block cap so as not to interfere with adjustments to and servicing of that part of the machine. A second "L" on the horizontal nipple allows the lubricator cup to be screwed directly into it. With this arrangement, the fitting may be refilled with soft cup grease without running risk of clipping fingers or having gloves caught by clutch adjusting screws.

4. DERRICK RAIL

Single Board Three Feet Above Derrick Floor Permits Escape in Emergency

ELEVATED from 8 to as much as 12 feet above ground, the average derrick floor must be equipped with railing to prevent the roughnecks from backing off the platform while at work; yet the area must not be so completely enclosed that escape is hindered in case a tong back-up line parts and suddenly flails around the drill stem or in case a derrick collapse places premium on split second flight from the floor.

One contractor encloses his floor with a railing of 2 x 6-inch timbers, dressed on all sides to eliminate danger from splinters but set high enough so a man can slide, roll or swing beneath the rail, hang from it an instant, and then drop clear, to land on his feet below. Wherever possible, all material is kept away from the immediate neighborhood of the derrick to afford safe landing if a jump is required.

Use of the single timber, with at least a 3-foot clearance below its lower edge, safeguards against accidental fall, yet allows the floor to be cleared in much less time than the usual pipe or old cable enclosure which must be climbed over or through in an emergency.

5. PIPE HANDLING

Convenient Method For Pipe Racking

PACKING of various diameters of drill pipe on a deep test requires close racking of the many stands as the well reaches greater depths, if the pipe is to be accommodated within the close confines of the upper derrick structure.

One drilling contractor meets this problem with an adjustable finger board, the base of which is a heavy I-beam, slotted along the upper flanges on both sides of the web. U-bolts, working in these slots, provide adjustable fastening for the fingers, allowing them to be quickly spaced for large pipe, or brought closer together to accommodate the smaller diameter pipe as the drilling proceeds.

The fingers used with this beam are shod with narrow skid faces against which the drill pipe contacts, affording minimum frictional resistance as the derrick man manipulates the pipe. Safety of the derrick man is enhanced by facing the tops of the fingers with broad strips, [illegible] at intervals. These stan[illegible]ps are as wide as possible [illegible]ut contacting the drill pipe, thus preventing their being fouled with drilling mud brought out on pipe joints.

Close racking of stands of drill pipe on a deep test is provided by this adjustable finger board.

6. BOILER CARE

Guard Aids Boiler Appearance

A GUARD attached behind the cocks prevents splash of water or steam from streaking up the front of a boiler. It may be constructed of light metal in the form of an oblong box with holes in the back corresponding with the gauge cock connections. A 1-inch rim on the open side, facing outward, prevents water and steam from blowing beyond the box. A ¼-inch drain line connected to the lower corner drains the condensate to the combustion chamber or to some other point of disposition.

A galvanized iron box surrounding boiler gauge cocks prevents splash when testing water level. A ¼-inch drain takes away the condensate.

7. LUBRICATION

Location Provides Steady Oil Flow

STANDARDIZING on location of lubricators for its drilling equipment, one company suspends the unit as close to one of the drilling boilers as possible so as to utilize radiated heat to maintain desired fluidity of oil during cold weather.

By setting the lubricator against the boiler, a full flow of oil through the drip and into the steam line is assured as soon as steam pressure has been generated to the point where it will serve to motivate any of the equipment. There is no delay in providing the equipment with lubricant at the time of starting up, when surfaces are most in need of oiling and when wear is more severe than at any other period during drilling operations.

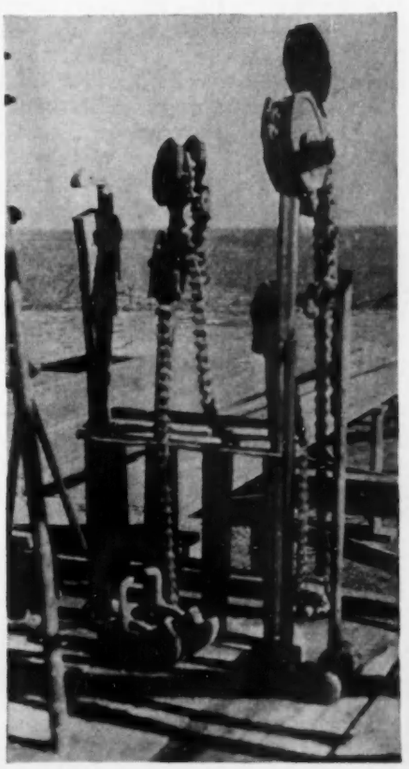
Placement of this lubricator next to the drilling boiler maintains fluidity of oil during cold weather.

8. TOOL CARE

Derrick Rack for Chain Tongs

TALLOW candle molds used in pioneer days suggest the design of a stand for chain tongs and large pipe wrenches used by Helmerich & Payne. The stand makes these tools constantly available and keeps them in good condition.

Two squares of tank steel, about 18 inches on a side, and nine 2-inch pipes about 20 inches long constitute materials for the stand. The nipples are welded equi-distant from each other, connecting the sheets of tank steel as parallelograms. Holes are cut over the nipples to form pockets for the wrench handles in one sheet. The other sheet, providing the bottom of the stand, is not perforated. It prevents ends of the wrenches and tongs from becoming jammed in a crack of the derrick floor.



Chain tongs and large pipe wrenches are provided a place by this stand mounted on the derrick floor.

Drilling Runs Higher in 1940 Than in 1939

By L. J. LOGAN, Associate Editor

ALTHOUGH drilling was handicapped greatly by the extremely cold weather of late January and early February throughout most of the country, the industry so far this year has completed around 10 percent more new wells than it did in the corresponding period of 1939.

The margin of increase over the 1939 drilling curve has varied considerably from week to week; and the more recent weeks, following moderation of the weather, have brought relatively more drilling.

Thus at the middle of March cumulated completions were somewhat over 10 percent more numerous than those in the corresponding period last year.

At the end of February, 7.7 percent more wells had been completed than in the first two months of 1939, the cumulative total for 1940 having been 4703 completions, against 4365 in 1939.

The continued relatively brisk drilling activity contrasts with the slowing down of production and business volumes in many other industries since the beginning of this year. The aggressive field work seems to reflect, therefore, a maintenance of confidence that the oil industry will have a comparatively good year. It may indicate, at the same time, that in proceeding with development work, oil producers do not regard the recent cutting down of industrial activity as more than a temporary movement, of no particularly adverse implications.

In that connection, many economists and business leaders foresaw a let-down in early 1940 from the record-breaking business levels of late 1939, but thought—and still think—that some further expansion of business would be shown for 1940.

Oil Industry Situation

Within the industry there have not been developments calling for any important revisions of early anticipations that 1940 would be a generally satisfactory year and possibly a considerably better year than 1939.

Crude oil prices have been kept generally steady, except for the California reductions of February 1 that averaged around 7 cents a barrels; and for the nation as a whole, that decline is partially compensated by the improved prices of Pennsylvania grade crude, postings in the Mid-Continent having remained the same as in 1938.

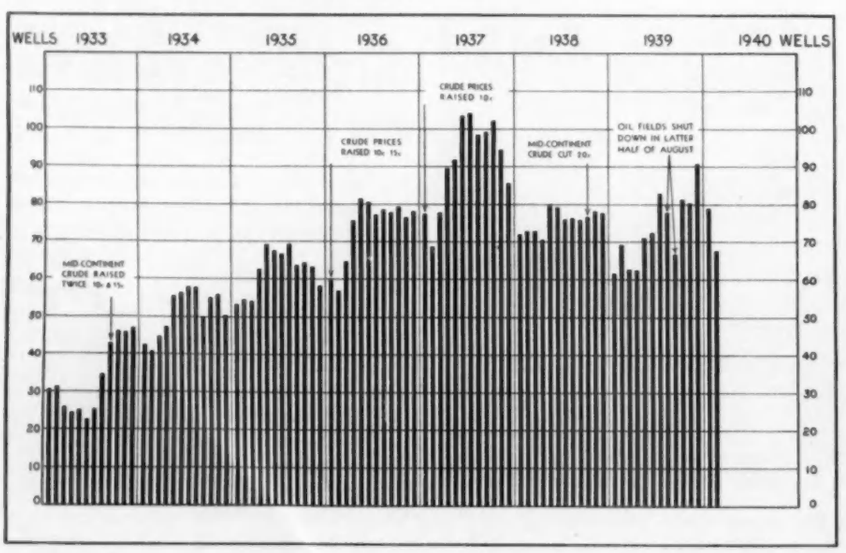
Crude oil prices directly affect drilling, and the maintenance of former postings has encouraged investment in new wells in previous or increased proportions.

Crude postings themselves must be determined ultimately by the prices for which refiners can sell the derivatives of the barrel of crude, and indirectly, therefore, drilling is influenced by the markets for refined products. However, the crude oil producer ordinarily is not concerned greatly with developments in the refined oil markets, and crude postings rather than product prices largely determine his drilling program.

This year, nevertheless, even the refined oil markets have been of an encouraging nature for the producer of the raw material. Gasoline prices have declined seriously from the levels of last fall, under the burden of surplus stocks, but they are a little better than at this time last year. And the unsatisfactory gasoline market is compensated by materially improved prices for practically all other petroleum products, including fuel oils, kerosene, and lubricants.

Meanwhile, there are hopes that spring will bring improvement of gasoline prices along with the seasonal expansion of motor vehicle

Average Number of Wells Completed Daily in U. S.
(By Months, January, 1933-February, 1940)



traffic, as such improvement frequently has occurred in the past.

Retarding Influences

It is true, nevertheless, that gasoline stocks are so high as to threaten a relatively weak gasoline market for this whole year, and in so far as the gasoline market may affect the crude markets adversely, it will act as a brake on drilling.

The crude market and drilling also may be affected unfavorably in coming months by the increasingly serious overproduction of crude. Illinois continues to produce materially in excess of indicated firm market demand, and probably will show a further substantial expansion in output, in the continued absence of proration. And lately, Texas, New Mexico, Louisiana, Arkansas, and Kansas have liberalized allowables, all those states having authorized production during March in excess of the Bureau of Mines estimates of demand. Eight prorated states that account for 85 percent of all United States crude production are scheduled to turn out about 225,000 barrels a day more than the aggregate market demand for their oil. In the week ended March 11 the national production averaged 3,828,550 barrels daily, which was 328,000 barrels a day more than the indicated average daily demand for domestic crude in March and only about 80,000 barrels a day less than the all-time peak output of last August. It is to be expected, in view of the current large production, that large additions to crude storage will occur, unless seriously excessive quantities are run to refinery stills.

February of:	Average Number of Wells Completed Daily
1933	31.2
1934	40.8
1935	54.4
1936	56.6
1937	68.6
1938	73.9
1939	69.4
1940	67.6

February Results

The decline in drilling that occurred in January was extended further in February, as exceptionally severe weather prevailed. But in spite of the curtailment of work, completions compared closely with those of February in other recent years, nearly equaling the records for 1937 and 1939, although not quite so near to that for 1938.

The completions of February, 1940, having averaged 67.6 daily, were only around 2 percent under those of February, 1939 and 1937, and 8 percent under those of February, 1937.

Presented herewith are figures showing how much drilling has occurred in February in each of the years from 1933 through 1940.

March Outlook

March frequently brings increased drilling, because of more favorable weather, and it will do so this year if the trends of the first half of the month continue.

Considerably more rigs were in operation on March 1 than on February 1, as shown in the accompanying table on current drilling activity; and the active operations were 6 percent more numerous than those of March 1 last year. Consequently, it is indicated that March, 1940, will furnish more new wells than either February, 1940, or March, 1939.

States that were appreciably more active on March 1 than on February 1 included Illinois, Indiana, Pennsylvania, and Wyoming, while minor gains were shown by other states. The outstanding decrease was that recorded for California, where active operations dropped from 308 on February 1 to 212 on March 1, following the reduction of crude prices at the beginning of February. The state had

Completions for First Two Months 7.7 Percent Over 1939 Level

STATE OR DISTRICT	FEBRUARY, 1940, COMPLETIONS* AND CRUDE OIL PRODUCTION						COMPLETIONS AND PRODUCTION IN FIRST TWO MONTHS, 1940 AND 1939								
							WELLS COMPLETED			DETAILS OF 1940 DRILLING				BARRELS PRODUCTION		
	Total Wells	Oil	Gas	Dry	Initial Production	Production for February	1940: 2 Mo.	1939: 2 Mo.	Percent Change	Oil	Gas	Dry	Initial Production	1940: 2 Months	1939: 2 Months	Percent Change
Arkansas	11	9	...	2	4,040	2,003,350	30	45	— 33.3	24	1	5	8,954	4,174,050	3,072,900	+ 36.0
California	81	73	4	4	39,326	17,000,200	169	160	+ 5.3	153	6	10	103,988	35,912,600	36,788,700	— 2.5
Colorado	...	...	...	...	...	131,400	1	2	+ 50.0	...	...	1	...	258,100	236,700	+ 9.3
Illinois	209	177	...	32	177,820	11,581,250	545	625	— 12.8	440	4	101	299,749	22,475,450	8,342,350	+ 169.5
Indiana	23	11	1	11	1,157	§3,051,250	65	23	+ 182.2	33	7	25	4,873	§	§	...
Kansas	93	76	3	14	110,064	5,103,900	235	202	+ 16.3	185	6	44	248,257	10,412,000	8,702,400	+ 19.6
Kentucky	9	6	...	3	378	§	41	119	— 65.5	25	1	15	1,636	§	§	...
Louisiana	92	70	7	15	23,225	8,075,300	239	144	+ 66.0	180	15	44	51,867	16,456,500	15,564,350	+ 12.2
North Louisiana	24	14	7	3	1,479	1,989,950	75	55	+ 36.3	44	14	17	4,775	4,118,100	4,201,050	— 2.0
South Louisiana	68	56	...	12	21,746	6,085,350	164	89	+ 84.2	136	1	27	47,092	12,338,400	11,363,300	+ 8.6
Michigan	88	62	3	23	14,941	1,869,350	222	178	+ 24.8	139	8	75	37,929	3,887,850	3,062,500	+ 26.7
Mississippi	8	6	...	2	5,600	182,800	24	1	+2300.0	15	1	8	10,017	290,800	...	...
Missouri	2	...	...	2	...	...	2	...	...	...	...	2	...	...	...	...
Montana	8	7	...	1	863	495,750	25	18	+ 39.0	17	2	6	1,768	1,033,000	800,500	+ 29.2
Nebraska	...	...	...	...	...	300	...	...	...	...	...	...	...	3,100	...	...
New Mexico	48	37	4	7	11,276	3,215,150	130	96	+ 35.5	98	7	25	39,060	6,445,350	5,913,000	+ 9.0
New York	†67	†63	1	3	332	§	†173	†82	+ 110.5	169	1	3	944	§	§	...
Ohio	†49	†21	19	9	122	§	†155	†146	+ 6.1	65	57	33	418	§	§	...
Oklahoma	145	88	11	46	38,592	12,135,650	327	299	+ 9.4	185	22	120	77,901	25,160,250	25,338,850	— 0.7
Pennsylvania	†196	†153	17	26	163	§	††539	‡244	+ 121.0	404	78	57	464	6,128,450	5,604,800	+ 9.3
South Dakota	1	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...
Texas	710	497	14	199	314,175	40,197,100	1,638	1,874	— 12.6	1,175	41	422	716,712	81,770,600	77,899,250	+ 5.0
East Texas Field	28	28	...	...	59,524	12,094,700	54	158	— 65.8	51	...	3	100,834	24,323,500	22,492,450	+ 8.1
Rest of East Texas	9	5	2	2	481	2,254,850	33	51	— 35.2	12	8	13	6,403	4,742,150	5,527,500	— 14.2
North Texas	143	91	1	51	45,121	2,880,600	364	224	+ 62.5	249	3	112	128,857	5,383,550	4,661,250	+ 15.5
South Texas	195	120	...	75	49,729	6,376,200	433	486	— 11.0	262	7	164	98,364	12,828,650	14,394,850	— 10.9
Corpus Christi Area	89	53	...	36	38,430	...	198	215	— 7.9	132	2	64	74,838	...	...	...
Laredo Area	92	61	...	31	10,904	...	197	196	+ 0.5	117	5	75	21,476	...	...	...
San Antonio Area	14	6	...	8	395	...	38	75	— 49.3	13	...	25	2,050	...	...	...
Texas Gulf Coast	91	62	3	26	14,772	6,715,100	205	260	— 21.2	149	6	50	39,970	13,430,200	12,789,550	+ 5.0
Texas Panhandle	35	29	5	1	9,143	2,195,100	89	58	+ 53.4	78	10	1	25,751	4,700,800	3,713,200	+ 26.6
West Texas	150	138	1	11	128,090	6,715,750	343	335	+ 2.1	321	1	21	288,696	14,039,950	12,369,000	+ 13.5
West Central Texas	59	24	2	33	7,315	964,800	117	67	+ 74.5	53	6	58	27,837	1,946,500	1,795,250	+ 8.4
Utah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
West Virginia	42	10	29	3	87	§	114	93	+ 22.7	25	68	21	236	§	§	...
Wyoming	10	9	...	1	8,111	1,924,050	28	14	+ 100.0	22	2	4	13,994	3,923,150	3,079,100	+ 27.4
Total United States	1,892	1,375	113	404	750,272	107,583,000	4,703	4,365	+ 7.7	3,354	327	1,022	1,635,511	219,043,650	194,394,550	+ 12.7

* February completions cover not the calendar month, but the four weeks, or 28 days, ended February 24.
† Includes water-input wells. ‡ January figures revised in accordance with The Producers Monthly, organ of The Bradford District Pennsylvania Oil Producers Association.
§ Figure shown for Pennsylvania is total for an Eastern States group which includes Indiana, Kentucky, Ohio, West Virginia, Pennsylvania, and New York.

Drilling Activity Continues at Brisk Pace; Near Peak Level

STATE OR DISTRICT	TOTAL RIGS IN OPERATION (Drilling, Rigs Up, Shut-Down)				DETAILS OF MARCH 1, 1940 FIELD ACTIVITY					
					Rigs in Operation			Prelim. Activity		
	Mar. 1, 1940	Feb. 1, 1940	Mar. 1, 1939	Percent Change from Year Ago	Drilling	Rigs Up	Shut-down	Derricks	Locations	Total Operations
Alabama	1	3	6	— 83.0	...	...	1	...	2	3
Arizona	8	8	6	+ 33.3	4	1	3	...	1	9
Arkansas	31	32	31	.....	23	6	2	7	1	39
California	212	308	340	— 37.7	114	69	29	26	42	280
Colorado	30	27	19	+ 57.8	4	2	24	...	...	30
Florida	4	3	5	— 20.0	1	...	3	1	...	5
Georgia	3	1	...	.....	3	...	...	...	...	3
Illinois	458	447	309	+ 48.2	383	48	27	37	8	503
Indiana	82	76	36	+ 127.5	35	16	31	...	2	84
Iowa	2	2	...	.....	...	...	2	...	...	2
Kansas	222	219	160	+ 38.8	173	26	23	18	10	250
Kentucky	61	59	69	— 11.7	16	12	33	...	...	61
Louisiana	209	210	189	+ 10.6	179	16	14	23	45	277
North Louisiana	65	70	74	— 12.2	49	6	10	10	2	77
South Louisiana	144	140	115	+ 16.0	130	10	4	13	43	200
Michigan	178	200	155	+ 14.8	130	29	19	17	15	210
Mississippi	25	36	11	+ 127.0	16	1	8	8	2	35
Missouri	15	10	...	.....	8	2	5	1	...	16
Montana	34	33	45	— 24.4	10	6	18	...	...	34
Nebraska	16	14	1	+1500.0	16	...	...	...	...	16
New Mexico	164	159	130	+ 26.2	112	13	39	1	26	191
New York	119	62	28	+ 326.0	83	26	10	...	...	119
Ohio	180	105	122	+ 47.6	119	44	17	...	...	180
Oklahoma	336	333	321	+ 4.7	257	30	49	50	38	424
Oregon	1	1	...	.....	...	...	1	...	...	1
Pennsylvania	367	162	130	+ 182.2	248	109	10	...	...	367
South Dakota	1	2	...	.....	1	...	...	...	...	1
Tennessee	6	4	...	.....	3	1	2	...	...	6
Texas	1,279	1,313	1,475	— 13.3	1,026	75	178	69	453	1,801
East Texas Field	11	16	10	+ 10.0	6	3	2	1	1	13
East Texas Border Counties	9	8	10	— 10.0	5	1	3	1	...	10
Rest of East Texas	45	44	32	+ 40.6	27	3	15	5	1	51
North Texas	233	235	148	+ 57.4	179	8	46	14	159	406
South Texas	311	305	329	— 5.5	246	24	41	21	77	409
Corpus Christi Area	161	161	173	— 6.9	138	10	13	9	37	207
Laredo Area	86	82	95	— 9.5	63	11	12	8	26	120
San Antonio Area	64	62	61	+ 4.9	45	3	16	4	14	82
Texas Gulf Coast	145	138	153	— 5.2	135	8	2	16	75	236
Texas Panhandle	112	129	71	+ 57.6	92	6	14	5	28	114
West Texas	310	325	310	.....	272	13	25	6	82	398
West Central Texas	103	113	83	+ 24.1	64	9	30	...	30	133
Utah	4	3	1	+ 300.0	1	...	3	...	...	4
Washington	1	1	...	.....	...	...	1	...	...	1
West Virginia	157	91	73	+ 113.5	121	26	10	...	...	157
Wyoming	71	63	58	+ 22.4	26	10	35	...	...	71
Total United States	4,277	3,987	4,029	+ 6.2	3,112	568	597	258	645	5,180

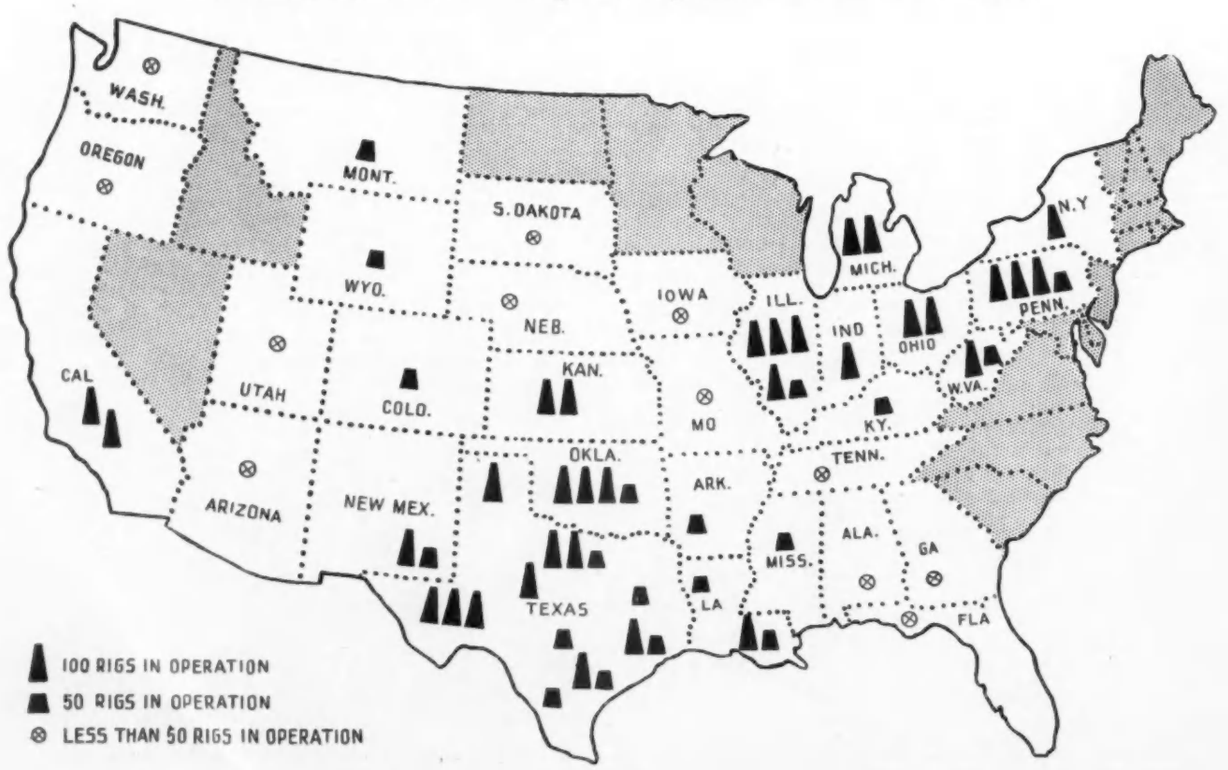
340 active tests under way on March 1 of last year.

First Two Months

Nearly all states and districts have been more active this year than last year. While completions for the country as a whole were 7.7 percent more numerous in January and February of 1940 than in the first two months of 1939, gains varied greatly among individual areas. Mississippi furnished 24 new wells, against only 1, and Indiana has had three times as much drilling, while Wyoming, New York and Pennsylvania have had twice as much. South Louisiana and West Central Texas also have been nearly twice as active as they were early last year, while gains of about 50 percent have occurred in Colorado, North Texas and the Texas Panhandle. Smaller increases have occurred in Kansas, North Louisiana, Michigan, Montana, New Mexico, Oklahoma, Ohio, West Virginia, and West Texas.

California still was running a little ahead of 1939 at the close of February. But fewer completions have occurred this year than last year in Arkansas, Illinois, Kentucky, Eastern Texas, Southwest Texas, and the Texas Gulf Coast.

Increased Number of Rigs in Operation March 1, 1940



HIGHLIGHTS IN THE WEEK'S NEWS

Courts

U. S. Supreme Court to rule on East Texas proration

Validity of an order issued by the Texas Railroad Commission under the state proration law, limiting production from wells owned by the Rowan & Nichols, which were held by the Fifth Circuit Court of Appeals to be arbitrary, unreasonable and confiscatory, will be determined by the United States Supreme Court. The high court last week granted a petition for review filed by the commission.

The company, which has five wells on a lease in the East Texas field with a potential capacity of about 20,000 barrels per day, was limited by the order under attack to an output of 112 barrels daily, and brought suit for an injunction on the ground that it had been discriminated against by reason of that part of the order permitting wells with a potential capacity of not exceeding 20 barrels a day to produce their maximum amount.

The result of the discrimination between wells producing less than 20 barrels per day and those with greater potentials, it was contended, is to permit the smaller wells to drain oil from under others.

The company made no attack upon the validity of the Texas conservation act itself, the validity of the total allowable amount of daily production fixed by the commission, the spacing and drilling regulations or the necessity for setting some minimum allowable for each well in the field. But the company challenged the method followed in fixing the allowables for individual wells.

Commission Appeal

The lower courts decided in favor of the oil company. The commission appealed, holding that the court had erred in a number of respects, including its findings that the commission must establish proration in such manner as to allocate to the Rowan & Nichols lease a daily allowable production which bears to the total daily allowable for the field the same ratio that the estimated recoverable oil beneath such lease bears to the estimated recoverable oil in the entire field to the exclusion of all other relevant physical and engineering factors.

"The holding of the Circuit Court of Appeals in this case decides an important question seriously affecting the administration of the conservation acts, not only of Texas but of other oil producing states having similar regulatory statutes, and vitally affecting the property rights of the producers of approximately 26,000 wells in the East Texas field alone," it was declared in the commission's petition to the Supreme Court.

"The theory adopted by the courts below would result in the confiscation of the oil of other producers and in itself would be violative of the fourteenth amendment to the Constitution of the United States."

The method of proration which the lower courts outlined, it was contended, "is confiscatory in two ways: first, by eliminating the 20-barrel allowable, it would so reduce the allowable of wells on small tracts as to make it impossible for the owners of such tracts to produce the oil beneath such tracts; and second, it would confiscate the property of the owners of leases in the western portion of the field by accelerating the natural eastward migration of the oil and making it impossible for such owners to produce more than a small fraction of the oil originally beneath their leases."

Contend Fair Share Obtained

The method of proration adopted by the commission, it was claimed, "substantially gives" to operators in the field, and particularly Rowan & Nichols, a reasonable opportunity to recover their fair share of the oil.

Opposing the review, counsel for the company contended that the lower courts had properly interpreted the situation, particularly in the light of claims that under the commission's orders the company's production was so unfairly restricted as compared with that of other operators that it would take it 39 years to recover its oil, whereas the rest of the field would have taken out all of the recoverable oil under it within 11 years.

"The undisputed testimony showed that the allocation of the allowable on a practical per well basis did not prevent waste but, on the contrary, was conducive to waste," it was declared.

"The testimony showed that there were other orders which the commission could have adopted, curtailing, rather than creating, waste, and at the same time, equitably allocating the allowable not alone on the basis of reserves, position on the structure and other relevant factors.

Federal court grants stay on East Texas injunction order

A motion to stay judgment in the suit of Humble Oil & Refining Company and Rowan & Nichols attacking the Texas Railroad Commission's oil proration schedule in the East Texas field was granted the commission March 14 by a three-judge federal court sitting in Houston. A 60-day delay was occasioned on a plea of the commission for a stay until the United States Supreme Court can act in a similar suit brought by Rowan & Nichols involving a former East Texas proration order.

On February 21, the three-judge court ruled that the January 24 oil proration order for the East Texas field was unreasonable, confiscatory and void with reference to leases held by Humble Oil & Refining Company and Rowan & Nichols. The companies asked immediate enforcement of the injunction.

Federal Circuit Judge Samuel Sibley, of Atlanta, and Federal Judge R. J. McMillan, of San Antonio, sat at the hearing. Federal Judge James V. Allred, of Houston, was absent because of a death in his family. It is believed Supreme Court will act on the commission's appeal in 60 to 90 days, and because of that possibility Judge Sibley stated the court was inclined to await such action before enforcing the injunction.

The court indicated it felt a distinct hesitancy to recommend a formula for an East Texas field proration schedule, as such a recommendation might prove a boomerang in light of changes that may occur. What might seem fair now could prove inequitable in the future, the court said.

Humble Oil & Refining Company submitted a proposed form of judgment, but the court objected to several paragraphs in the form. The company claimed it was losing $25,000 per day, or around $400,000 monthly under the present proration schedule. The court countered with the statement favorable location of the company's leases may find it producing oil when edge leases on both sides of the field have been abandoned.

The court stressed the fact that on February 21 it had ruled in favor of the companies, but remained firm in its stand to await a decision of the Su-

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preme Court in the previous case before making the injunction effective.

The court also took recognition of "an avalanche of injunction suits" that would be filed should the injunction be made effective immediately, as other operators would want increased allowables.

Attorneys for the companies said that if the court would permit them to produce more oil during the stay term, and if the United States Supreme Court should uphold the railroad commission's order of January 24, the companies would agree that the excess oil be charged back against their properties over a reasonable period of time. The court held that such a provision might lead to dangerous complications, and that the posting of bonds on either side probably would be unsatisfactory.

The basis of Humble Oil & Refining Company's suit attacking the railroad commission's East Texas field proration schedule was that the company had about 14.3 percent of all the oil under its leases, but was permitted to produce less than that percentage of the total daily allowable. Subsequent proration orders have given some relief, it was claimed, but the current proration order failed to give the company its full share of production.

After the March 14 decision in Houston, Commissioners Jerry Sadler and E. O. Thompson, said the temporary relief granted by the court "had prevented chaos and would mean a great deal to East Texas operators, royalty owners and employes."

Control

Thompson tells Cole about August shutdown

Activities of the Interstate Oil Compact Commission were vigorously defended and the Cole Bill bitterly attacked in a statement filed with the House Interstate Commerce oil subcommittee March 14 by Ernest O. Thompson of the Texas Railroad Commission.

The statement was filed for the purpose of bringing before the subcommittee information which Thompson was unable to submit personally during the recent hearings, because of illness.

However, it was said by Representative William P. Cole, Jr., of Maryland, chairman of the subcommittee, Thompson may yet be called to testify.

While in Washington it was held that, even if the subcommittee should approve of the bill in its present form, which appears at this time extremely unlikely, the measure has virtually no chance of enactment during the current session of Congress. It was learned that Secretary of the Interior Harold L. Ickes was preparing to take his fight for the legislation into the heart of the largest oil field of the country, speaking before the Kilgore, Texas chamber of commerce March 27.

In the statement filed with the subcommittee, Thompson vigorously attacked the purposes of the Cole bill and lauded the progress in conservation made by the principal producing states which are members of the compact.

Replying to charges of government witnesses that the commission has been unable to function properly because of a lack of power, he asserted that the compact has "the greatest force on earth behind it, and that is the power of enlightened public opinion."

"Texas would not join it if it had the power to force other states to do anything," he asserted. "We do not believe that sovereignty is compatible with force."

Responding to the request of subcommittee members for an explanation of what occurred at the Oklahoma City meeting of the compact commission last August, prior to the general shutdown, Thompson said that after a 20-cent-per-barrel reduction was made by one of the leading buying companies, the Texas Railroad Commission took the initiative in ordering the shutdown, feeling that the price reduction was caused by excess production.

"I called the meeting," he said, "and I told them Texas had already shut down. I did not urge any other states to shut down. We simply talked the situation over and each state made its own announcement as to what it intended to do."

A survey of above-ground stocks following the shutdown, he said, showed that they had been reduced by 30,000,000 barrels to approximately 230,000,000 barrels which "seemed to put the stock position in about the right place."

Federal Power Commission plans drastic gas regulation

Efforts to impose a control of production more drastic even than that contemplated by the Cole bill were charged against the Federal Power Commission last week by Russell B. Brown, general counsel of the Independent Petroleum Association.

These efforts, Brown declared, are being exerted by attorneys of the commission, arguing in a case now pending before it that Section 1 of the Natural Gas Act "does not exclude from the jurisdiction of the commission the sale of natural gas by producers when such sales are made in interstate commerce for resale for ultimate public consumption."

"Where the federal oil control bill seeks to regulate production of petroleum under the theory of waste prevention, this new movement, which may affect all wells from which gas is produced as well as oil, does not take into consideration conservation or waste prevention but deals solely with regulation as of a public utility," he declared. "Even the flimsy standards set up in the federal oil control bill would be lacking in this new form of government regulation."

Brown explained that Section 1 of the Natural Gas Act provides that it shall apply to the transportation and sale of natural gas in interstate commerce, but not to the production or gathering of natural gas, but that Power Commission attorneys contend that the prohibition does not impair the force of the affirmative language in the section.

"It would seem from this contention that natural gas may be produced without regulation but after being produced it cannot be sold, except under the authority of the commission, if it should eventually enter into interstate commerce," he said.

The Independent Petroleum Association, as well as the Mid-Continent Oil & Gas Association, will intervene in the proceedings before the commission in an effort to show the effect such an interpretation might have on the oil industry.

"If the industry is not permitted to sell its gas except in accordance with the regulations of the Federal Power Commission which may determine the price paid for that gas and after making available its records and books and compiling the innumerable reports which might be demanded, then some producers are likely to believe that to burn the gas in the field or blow it off into the air would be the lesser of two evils," he said.

Nye proposes another oil anti-trust investigation

Another investigation of alleged monopoly in the oil industry was proposed March 14 by Senator Gerald P. Nye, Republican of North Dakota, in a resolution providing for an inquiry by the Senate Judiciary Committee.

The senator's resolution would require the committee to study and report to the Senate "whether any person, partnership or corporation has violated, or is violating, the anti-trust laws by acting in a manner which created a monopoly or tends to create a monopoly for the control of the production, transportation, sale and distribution of natural gas and petroleum, and whether the anti-trust laws have been fully, adequately and impartially enforced to enable consumers and potential consumers to obtain supplies of natural gas and petroleum on a competitive basis."

The committee, to make the investigations, would be authorized to act both during the current session and the recess which will follow, and to subpoena witnesses and records. Cost of the investigation would be limited to $10,000.

Texas statewide hearing scheduled for March 20

The Texas statewide proration hearing to be held in Austin March 20 will present several serious problems.

Of paramount importance is the steadily increasing allowable, which this week approached 1,560,000 barrels a day. Texas Railroad Commission figures for the week ending March 9 showed an allowable of 1,495,935 barrels. However, on Friday of that week, orders were issued retroactive to March 1 which raised this figure 10,000 barrels a day, and subsequent increases during the past week added 14,065 barrels. Thus on March 16, the total allowable was at least 1,520,000 barrels, and probably more.

Commissioner Jerry Sadler has complained consistently at the increases which were granted to supply market demands not fully proven. He has expressed an opinion that the net demand on a sound basis is 1,408,000 barrels. Thus, Texas operators are allowed to produce over 100,000 barrels more than Sadler believes should be produced.

By granting the increases requested, the commission has departed from its standard set-up in the order which was effected on March 1.

Varied Technical Program Gets Record A.P.I. Attendance

By FRANK B. TAYLOR, Staff Writer

COMBINING the practical and economic angles of the petroleum industry with the technical, the American Petroleum Institute, Division of Production, offered a highly varied program at the Mid-Continent District meeting concluded March 15. The two-day meeting, highlighting papers and discussion on foremanship, rotary and cable tool drilling problems, financing, pumping, water flood operation and plugging off of bottom-hole waters, exceeded by more than 100 the past record attendance for a district meeting by registering a total of 715 oil men. General interest questions were discussed as well as those of current importance.

T. J. Hamilton, Mid-Continent Pump Supply Company, Oklahoma City, was elected chairman, succeeding C. H. Keplinger, Shell Oil Company, Wichita. H. E. Miller, Lario Oil & Gas Company, Wichita, was elected vice chairman for Kansas; R. S. Knappen, Gulf Oil Corporation, Tulsa, was elected vice chairman for Oklahoma; George Berlin, Skelly Oil Company, Pampa, Texas, was elected vice chairman for the Texas Panhandle, and Herbert Goodpaster, Kerlyn Oil Company, Oklahoma City, was reelected secretary-treasurer.

The following were placed on the advisory committee: C. H. Keplinger, chairman, Shell Oil Company, Wichita; Powell Briscoe, Oklahoma City; K. A. Covell, The Pure Oil Company, Tulsa; C. A. Daniels, Phillips Petroleum Company, Amarillo; J. D. Dyer, Continental Oil Company, Ponca City; W. W. Flenniken, Halliburton Oil Well Cementing Company, Amarillo; W. W. Fleming, The Ohio Oil Company, Tulsa; J. S. Freeman, Skelly Oil Company, Tulsa; T. J. Hamilton, Cities Service Oil Company; T. J. Hamilton, Mid-Continent Pump Supply Company, Oklahoma City; N. M. Utchinson, Cities Service Oil Company, Bartlesville; J. E. Holm, Atlantic Refining Company, Tulsa; T. C. Johnson, Wichita; R. C. Kay, Amarillo; M. J. Kirwin, Indian Territory Illuminating Oil Company, Bartlesville; D. R. Knowlton, Phillips Petroleum Company, Bartlesville; H. W. Ladd, Stanolind Oil & Gas Company, Tulsa; R. H. Lynn, Kerlyn Oil Company, Oklahoma City; M. M. Mahaffey, Cities Service Oil Company, Eldorado; H. V. Mathews, Stanolind Oil & Gas Company, Pampa, Texas; Howard Price, J. M. Huber Corporation, Borger, Texas; E. E. Newport, Sinclair Prairie Oil Company, McPherson, Kansas; J. F. O'Shaughnessy, Lario Oil & Gas Company, Wichita; H. N. Pardee, The Texas Company, Tulsa; W. G. Ricketts, Amerada Petroleum Corporation, Tulsa; A. S. Ritchie, McPherson Drilling Company, Wichita; G. S. Sanderson, Gulf Oil Corporation, Tulsa; C. S. Warren, Cities Service Oil Company, Bartlesville; C. D. Watson, The Carter Oil Company, Tulsa; D. E. Williams, Danciger Oil & Gas Company, Pampa, and H. E. Zoller, Derby Oil Company, Wichita.

At a special luncheon, the Mid-Continent District presented Carl A. Young with a leather traveling bag in appreciation of his long years of valuable service to the institute. Young has been secretary of the Division of Production since its inception in 1924. Under his guidance comes the direction and consolidation of all standardization work of the institute, the Production Division's several hundred committees, research projects, vocational training work, annual meetings and numerous district and local chapter gatherings. With a staff of only two men and five stenographers the innumerable details that such an abundance of work requires are efficiently handled.

Abstracts of papers presented at the Mid-Continent meeting follow:

Oil Meters of the Positive Displacement Type in Production Work

By L. R. VAN ARSDALE

Pittsburgh Equitable Meter Company

Briefly pointing out the application of meters in determination of volumes of fluid while in a state of flow, the author sketched measurement progress as applied to the petroleum industry. It was shown that in the marketing branch of the industry, the fluid meter is widely applied and more accurate than tank gauges. On the other hand, research in meter development for production, pipe line and refinery is restricted to the past few years; years in which great strides have been made. In the latter departments a large number of practical installations are in operation, satisfactorily meeting such conditions as high pressure, high temperatures, corrosives, abrasives, impurities, dissolved gas and entrained gas.

It was shown that the positive meter operates much like a bucket gauge, a procedure which is followed by the mechanism of the meter when it displaces a certain volume each cycle, and then registers the total number of cycles. To make up this metering arrangement, the device consists of a measuring chamber, sealed either by capillary means through the measured liquid or by positive contact through expanding ring or flexible cup. Other requisities of the metering unit are counters, gears and necessary ports.

With this explanation, the author discussed the various types of meters in common use today for measuring fluids. Of these types, the disc meter consists of two conical sections, and a section of a sphere within which a disc nutates to form two wedge-shaped segments. The piston type of meter reverses the action of the common power pump used to create fluid flow. Instead, the meter is driven by the flow of the fluid to be measured, the cylinder of the meter measuring the volume and the strokes of the piston determining the number of volumes measured. The oscillating piston meter incorporates a measuring chamber consisting of two cyilnders, the larger of which acts as the body while the smaller oscillates inside forming four volumetric segments per cycle. The rotary type of meter consists of a circular chamber which rotates on a point, the chamber being divided into measuring segments by means of vanes.

Van Arsdale then detailed the use and manner of applying measuring devices to flowing wells, pumping wells and to wells making water. He gave fundamentals of each type of installation and detailed the manner of operation. In conclusion, he pointed out important factors fundamental to positive meter operation, and stated that despite the many difficulties which necessarily had to be overcome in meter design and construction, manufacturers have succeeded in perfecting the instrument to the point that it will give accurate measurement if subjected to proper operation and maintenance.

Pressure Maintenance in Cunningham, Kansas, Lansing Lime Pool

By COLIN C. RAE

Skelly Oil Company

Development of Cunningham pool as an example of advantages to be gained from a well-founded pressure maintenance program, factors to be considered in the establishment of such a program, and the result in terms of additional recovery, are fundamentals of a paper presented by Colin Rae.

Historically, Cunningham pool, of Pratt and Kingman counties, Kansas, was discovered by Skelly Oil Company's Miles A-1, completed in January, 1932, for 253 barrels per day. The test was drilled as a result of extensive core drill work by the company, in which Cimarron anhydrite, 350 to 450 feet, was used as the marker. Subsequent development proved a dome with an Ordovician closure of some 320 feet, with oil production in Lansing-Kansas City lime at 3400-3500 feet and gas in other porous formations. The amount of producing closure on the

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lime was determined as being 80 feet, with water lower on structure. The producing area covers about 1400 acres, with 44 wells completed to the present time.

Limited by lack of pipe line outlet until 1934, development was not rapid. Drilling showed pay section averages less than 8 feet, that porosity of the strata is about 11 percent and that the average permeability is 105 millidarcys. Daily production is about 868 barrels, with all producers in the field owned by Skelly Oil Company.

Prior to the start of repressuring work in January, 1936, the field had produced about 1,009,000 barrels which resulted in a pressure drop from an initial of 1100 pounds to 424 pounds per square inch. Since pressure maintenance has been undertaken, about 1,000,000 additional barrels of crude have been produced. Also during this time the bottom-hole pressure has been raised to and held at 575 pounds, accomplished by returning 85 percent of the produced gas to the formation after it has been passed through the firm's gasoline plant. Some of the wells have been placed on the pump within recent months but about 25 percent of the producers still flow their production. The gas/oil ratio has declined since inauguration of the repressuring program.

First estimates indicated an ultimate recovery of about 2000 barrels per acre, a comparatively small recovery. With the aid of pressure from returned gas, basing the estimate upon a study of bottom-hole pressures as applied against accumulated recovery, the ultimate of the pool is now concluded to be about 5,200,000 barrels. It is indicated, then, that without the application of repressuring, a number of the wells now producing would have become economically depleted and would have been ready for abandonment.

Foremanship

By H. E. ZOLLER
Derby Oil Company

Foremanship occupies an important key position between the employe and management, and is therefore highly influential insofar as industrial success is concerned. The petroleum industry has maintained good industrial relations with an unusually high standard of wages and living conditions for its personnel, and has been fortunate in avoiding serious or widespread labor disputes. It is not improbable that these conditions are due to the fact that that the industry has not become dormant in progress and development of new ideas involving foremanship training.

There are four commonly recognized types of foremen. The first is the driver type who has little regard for his men, and little more for his firm. He results in high labor turnover, high operating costs and constant dissatisfaction. The personality type too often places goodfellowship above duty, and as a result the firm is likely to suffer through laxity and delinquency toward required work. The mechanic type could as well be termed the methodical, for although possessing a superior knowledge of jobs and procedure, he demands the same be expressed in any task of work. He lacks ability to see the human side of a job and creates ill-will. The foreman manager type is not alone a supervisor, but is also a capable instructor, and is the best type of foreman. His relations are equally pleasant with employe and firm, and he developes responsibility in those under him.

From this analysis the author developed basic principles of foremanship, going into history and into specific cases. He explained essentials of gaining favor of men, and of means to touch their emotions. He also pointed out emotional reactions to various stimuli, and indicated whether or not they would react to the advantage of the foreman or would react to his detriment. He evaluated the smile, the kind word, the facial expression.

It was pointed out that there are a number of obstacles to eliminate from the mind before a man can account for his ultimate value to any firm. These may be in many forms, such as fear, anti-progressive attitude, distrust, habit and many others. Interdependence, willingness to aid, understanding and sympathetic discussion amounting to friendly supervision pays rich dividends in foremanship.

Larger Gas Fields in Kansas

By J. H. PAGE
Kansas State Corporation Commission

The production and sale of natural gas has been one of Kansas' major industries for the past 50 years. It began shortly after discovery of commercial production in Miami County in 1860. From that date to the present, natural gas development has accounted for an estimated 15,000 to 25,000 wells in the shallow, eastern producing belt of the state, while western production has more closely paralleled the construction of outlet facilities. The average eastern producer is from 800 to 1000 feet in depth, Bartlesville sand of Pennsylvanian age being the major pay strata.

Although the Kansas gas industry found its initial supply in the eastern counties, it is in the western part of the state that the greater reserves have been found. Here is Hugoton field, thought to form the north part of a huge producing area including the Amarillo, Texas, gas field. Discovered in 1922, the field has been slowly under development since that time as eastern markets have opened demand through pipe line outlets. In all, Hugoton field now is proven in seven counties. Original rock pressure is estimated at 440 pounds. Withdrawals to January 1, 1940, have been 175,000,000 cubic feet, but this represents only about 1.27 percent of the original recoverable gas.

Hugoton production is from 2300 to 2700 feet where two sandy lime sections are encountered. The gas is sweet, contains about .4-gallon of gasoline per million cubic feet, and checks at about 1000 to 1025 BTU. One carbon plant is operating in the field and one is nearing completion.

Cunningham gas field of Kingman County contains large reserves in Viola, Simpson and Arbuckle formations. The field produces oil from the Lansing-Kansas City formation of the Pennsylvanian. The pool owes its discovery to core drill. Until recently it had no pipe line outlet. Twenty-one of the field's gas producers have been drilled within the past year.

Otis gas field of Rush and Barton counties was opened in 1930 following mapping of surface outcrops, in this case Cretaceous sandstone. As a result of normal development, there are now 45 gas producers, 14 combination wells and 3 oil wells in the pool. Structurally, the field lies on the southwest flank of the granite core of Central Kansas Uplift. The producing formation has been correlated with the Reagan sand of Oklahoma.

Medicine Lodge field, Barber County, was discovered in 1927. There are 3 oil

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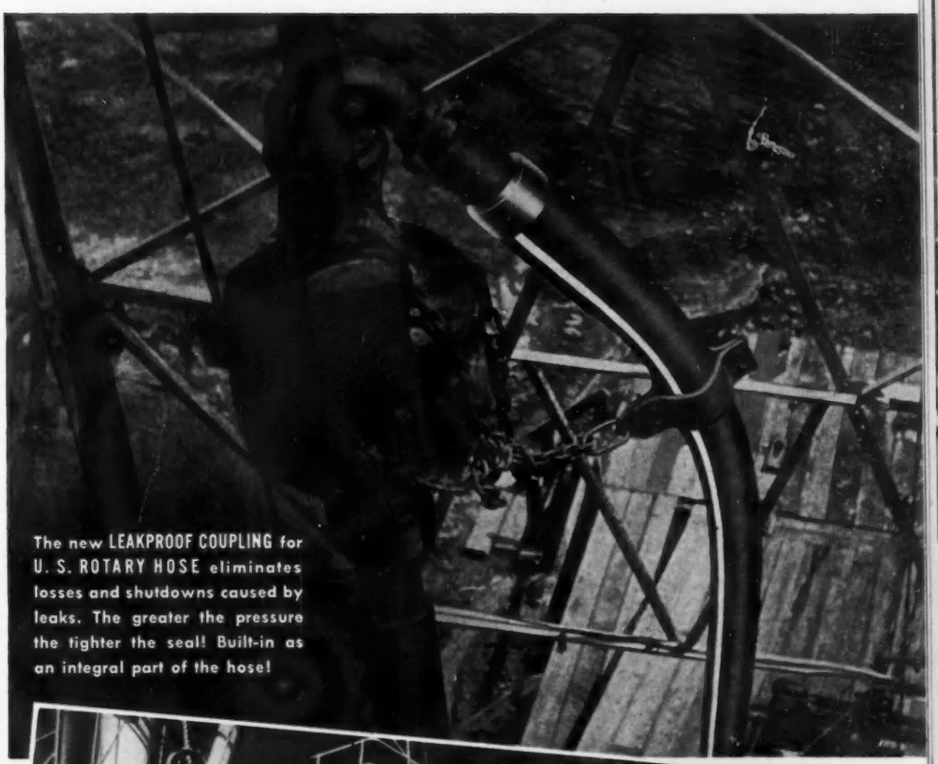

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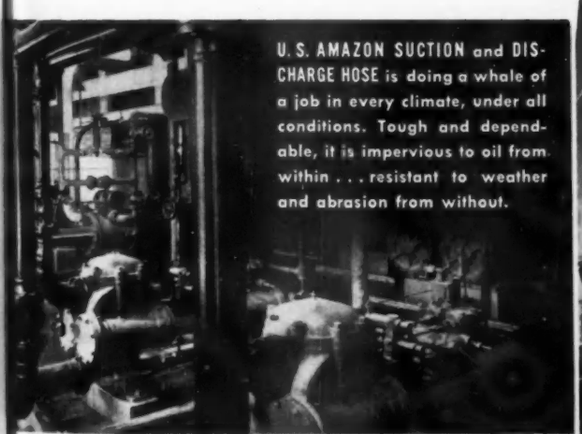

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wells in this field which is productive of gas from Mississippi lime. One of the oil wells is in the Viola and the other two are in Simpson sand. There are 32 gas producers in the field.

Lyons gas field of Rice County was discovered by Atlantic Refining Company with Pulliam 1-A, completed in 1936 with an open flow of 150,000,000 cubic feet per day. Prior to this completion, Shell Oil Company proved a gas zone at the depth but ran into mechanical difficulties and could not complete. At present there are 5 wells producing from the Arbuckle, all production being high in hydrogen-sulphide content and carrying considerable distillate. One combination well produces crude from Simpson formation. Burrton field, chiefly important for its crude production, and McPherson County for the number of producing gas pools within its borders, were mentioned.

In summarizing, the author listed the gas productive sands of the state as follows:

Cretaceous sand, Herington lime, Krider dolomite, Winfield lime, Ft. Riley lime, Florence flint, Admire shale, Stalnaker sand, Layton sand or lime, Red sand, Peru sand, Weiser sand, Oswego sand and lime, Oswego shale, Squirrel sand, Upper Bartlesville sand, Lower Bartlesville sand, Burgess sand, Mississippi chat, First break, Sandy zone in Mississippi, Misener sand, Viola lime, Simpson sand, Arbuckle dolomite, Reagan sand.

Analysis of the various fields now productive of natural gas in large volumes showed the state has a reserve of some 13,794,000,000 cubic feet in Cunningham, Hugoton, Medicine Lodge, and Otis fields.

Submergible Electrical Centrifugal Pumping Units and Their Application

By P. E. Loye
Reda Pump Company

Pumping equipment of the electrical, submergible, centrifugal type is now in use in wells varying from 500 to 8500 feet in depth, and is being used to produce daily volumes ranging from 5 to 14,000 barrels. A few of the unique features of this type of equipment are its application to crooked holes, its ability to handle abrasive materials in suspension in the fluid, its reduction of difficulties arising from emulsion and paraffin formation and the fact that it requires no foundation.

Essentially, the unit is an electric motor of the squirrel cage, induction type which drives a vertical assembly of centrifugal impellers through direct connection. This pump, as a unit, is run into the well on tubing, being suspended in a manner similar to the suspension of a working barrel. A protected cable carries electric power to the motor.

Over 750 wells have used this type of pump during the past ten years, and installations are in operation in New York, Michigan, Illinois, California and each of the Mid-Continent states. Motor power varies from 3½ to 135 horsepower, depending upon the particular operation. Casing size imposes the one factor to limit maximum production volumes.

The author explained use of the pump to determine fluid levels at various production rates, and expressed the computation in formula. A second method was described in which no instruments are necessary and no calculations are required. Economic phases of pumping production were detailed and specific cases analyzed. In these typical cases, wherein conditions were stated, all factors were discussed that had bearing on cost per barrel, and this in turn was broken down into four major items: maintenance, transportation, pulling and running expense, and electricity.

Taking the Pulse of the Pumping Well

By D. O. Johnson
The S. M. Jones Company

Making of well studies offers a procedure for material reduction of pumping costs. The well study, as such, falls under two classifications. The first of these is to increase efficiency, the second is toward establishment of a guide for selection of proper equipment; and both of these are vital to the cost of operation. Such an interpretation is made through the dynamometer card.

It is estimated that some 15,000 wells will go on the pump for the first time during 1940; this forming only one year's increase in the constantly increasing number of wells producing by means of lifting equipment. The cost of producing these wells is high; in many cases, too high. An increasing number of engineers consequently are analyzing pumping problems with a view toward lowering per-barrel lifting costs. As expressed by some engineers, the field is hardly scratched and the more a person studies the problem the more ways he can find to lower lifting costs.

The author explained the pumping system as being composed of three main parts. These are the motivating unit, the pump and the connecting link between these two, or the sucker rod. The successful operation of the system depends upon proper operation of each part in relation to the whole. The most common and practical manner of roughly checking the efficiency of a pumping well is to consider the ratio between the actual amount of fluid being produced and the volume of fluid theoretically displaced, assuming the pump plunger to be traveling the same distance as the sucker rod. Provided this "apparent volumetric efficiency" is 80 percent or more, it may be considered good.

The author detailed means of taking "the pulse of a pumping well" and the general classification into which different types of wells most generally fall. He explained the requirements of each installation, of each pumping action to equipment, and the relation existing between capacities and the ability of a well to produce efficiently. He showed that careful examination of wells in one field might be used to indicate equipment selection in another, but that the polish rod dynamometer furnished exact information.

Some Practical Aspects of Water Flooding in Eastern Oklahoma and Kansas

By Lynn C. Converse
Max B. Millers & Co., Inc.
and
R. A. Hawkins
Consulting Engineer

Water flooding in eastern Oklahoma and Kansas produced 8,500,000 barrels of crude up to January 1, 1940. At present, the various projects are producing about 270,000 barrels a month, production being obtained from 6000 acres developed at a total expense of some $10,000,000 including the cost of the leases. There are 4603 acres under flood in Oklahoma and 673 acres under active flood in Kansas.

Prior to 1938 there were 3969 acres under flood in Oklahoma, of which 220 acres have been completed or abandoned. Total production as of December 1, 1939, was 6,685,300 barrels with a possible ultimate of 8,355,000 barrels. Computing the value of the production from these acres on the basis of $1.10 per barrel, it is found that a net loss per acre of $145 was sustained. However, 30 percent of this acreage may be considered distinctly submarginal and account for a direct loss of more than $1000 per acre.

On the other hand, taking the five best floods from Oklahoma operations started prior to 1938, and which are representative of most of the work done since then, the picture is more promising. By applying the same fundamental costs an average profit of $934. One project is shown to have produced 7000 barrels per acre and to have a projected recovery of about 9500 barrels per acre. Early Kansas floods result in a net profit of $148 per acre, 38 percent being unprofitable acreage.

Necessity of corrective shooting was stressed and the advantage of laboratory procedure pointed out by the author. The importance of exact knowledge of the viscosity of the oil was emphasized, while spacing was pointed out as being a consideration of time only. Lack of experience with the sands and characteristics of Mid-Continent sectors was pointed out as the reason for early failures chalked up to water flood attempts.

Rotary Completion of Gas Wells—Texas Panhandle Area

By J. M. Gardner
Phillips Petroleum Company

A new method of completing rotary-drilled wells in the gas area of the Texas Panhandle involves use of gas as a circulating medium with just enough water to afford the necessary lubrication and cleaning action for the bit. To date, seven wells have been completed by this means, with results indicating a saving of 10 days' time when the gas-rotary method is applied in preference to the former cable tool method.

To setting of pipe in the top of the Dolomite, the gas-rotary method is the same as any other completion means employed, except that a substructure derrick is used to afford required clearance for the hookup utilized in the drilling-in process. Equipment used on the well includes a quick-acting master gate, a blowout preventer above, a steel cross, a spacer nipple and a drilling head accessible from the floor when master bushings are removed. Remote controls for blowout preventer and master gates are provided, and vent lines affixed to the cross.

For pressure, a combination gas engine-compressor unit is tied directly into the mud line, being shunted by a bypass. A reciprocating pump, gas operated, furnishes water through a ½-inch valve. An orifice meter is used to meas-

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ure volumes passed by the compressor.

After cementing and unloading hole, drilling is resumed with gas pressure. It has been found that 2,500,000 to 3,500,000 cubic feet at 250 to 350 pounds is sufficient to keep the hole clean of cuttings. Water is injected at about 2 barrels per hour. Average rotary speeds and bits are used.

As is the case with any radical change in procedure, certain advantages and disadvantages are apparent. The new method does not displace older and proven methods, but does offer a new principle. Further developments will in all probability result in more efficient as well as more scientific operations and improvements of initial operating means.

Search for Oil

By DANIEL SILVERMAN
Stanolind Oil and Gas Company

This subject, delivered as a talk rather than as a paper, analyzed various methods now employed for the purpose of finding crude petroleum reserves. It was pointed out that ever since mineral deposits assumed a value in the life of man, it has been thought there should be some manner of locating these deposits. While first efforts were somewhat supernatural in quality, the present search for hidden mineral deposits involves the foundations of the science of applied geophysics.

As the modern search for oil is based upon the anticlinal theory, or some variation of it, of the accumulation of deposits, the effort of the search may directly be concerned with the finding of a suitable reservoir condition rather than toward the discovery or location of a deposit itself. However, while this was and still remains fundamental to exploration, there are developed means which may directly be applied in the search for the deposit proper, not the condition under which the deposit is most likely to occur. These developments have naturally resulted from the continual search for new principles upon which to base investigations.

The speaker took up the various means of exploration or search, defined them, and analyzed the departures from general practice. Soil-gas-analysis methods were discussed. These being of a number of natures, they were mentioned in turn and included the mass spectrometer, analysis for wax in the soil, and analysis for the presence of petroleum derivatives in free gas contained in the soil. The presence of these compounds is attributed to the slow migration of the light constituents of crude petroleum from an accumulation within a reservoir to the surface of the earth.

There are a number of electrical methods by which the earth's resistivity is determined, the results being analyzed to determine subsurface structure and the possible presence of suitable traps for crude oil. Profiling is possible by variations of these methods.

Where the well is present, a highly important tool is electric logging. By its use the physicist is enabled to correlate between wells and fields, and to more or less determine the boundaries of a producing section. There are two methods by which results may be obtained. Another method makes use of temperature-recording instruments to show the log of a well in variations of degrees of temperature.

The use and adaption of gamma-ray activity to the well is another means of correlation in which a modified Geiger counter shows radiation from a formation. The application of seismic equipment to the search for oil is well known, but is constantly being improved so that it is more definite, accurate and applicable to a greater variation of conditions. The two major methods of seismic exploration were explained.

Oil Financing

By A. W. KINCAID
Fourth National Bank of Wichita

A new order exists in the banking business as well as in the oil industry. Changes in national economics have brought the realization that money is a competitive commodity, requiring a degree of salesmanship. Banks today are in competition with the government through such agencies as Reconstruction Finance Corporation, Commodities Credit Corporation, Federal Reserve Bank, etc. This has forced a change in the business of the banker, forcing him to seek other fields for the employment of idle funds. It was found necessary to adjust the business to the new order despite the fact that fundamental principles of good banking have not changed.

Expressive of the new order which has come to the oil industry and to banking alike is the fact that 254 new fields were found during the past year without the creation of an "oil boom" and with little actual excitement. Business has grown slow and orderly, as has petroleum development.

In consideration of petroleum as a war brace, it is pointed out that Germany, while able to produce only 2,700,000 metric tons in 1938, requires 7,000,000 tons during peace, and even more during war. Possible assistance from Rumania and Poland is considered negligible. Russia, second to the United States in petroleum production, found it possilbe to export only 1,500,000 metric tons of her 30,000,000 metric tons produced. This emphasizes the fact that Russia enjoys no surplus. The author said these facts provide a rainbow for the petroleum industry and for the general public of the United States. Although it is not always realized, every citizen is in some manner dependent upon the oil industry.

Cable Tool Drilling

By KURT SPRENGLING
DeGolyer, MacNaughton & McGhee
and
EUGENE A. STEPHENSON
University of Kansas

Basic principles employed in all cable tool operations were described and analyzed and human factors in drilling were evaluated and recommendations made.

Purpose of the investigation carried on by the authors was to discover the most effective number of drilling strokes per minute for various depths and various tool combinations so as to insure an approach to uniform performance regardless of depth. This investigation was carried on with the cooperation of numerous firms and agencies, and day-by-day drillers' logs were obtained in the field to constitute the basis for the analysis of the data presented.

Specifically, the authors studied the relation of shut-down time to drilling speeds at various depths, frequency relations involved in the operation of a string of cable tools, use of charts as an aid to changing the frequency to most accurately conform to derived efficiencies, various damping factors influencing the operation of equipment, and interpretation of dynamometer data adapted to cable tool use.

As a result of analysis of information obtained and checked, it was found that the following recommendations could be made.

1. Drilling frequencies used should at all times be maintained at the natural frequency of the system or one of its harmonic multiples.
2. The hitch used on the tools should be maintained at a uniform maximum height.
3. Power transmission systems should be redesigned to accommodate modern power applications. A possible improvement would be direct connection of an engine, preferably a double range electric motor, through a clutch to the end of the bull wheel shaft. The band wheel could be moved slightly to take its belt from a pulley on the engine shaft.
4. Facilities for handling casing should be made available equivalent to those of the rotary ring, making use of casing tongs and an accessible cathead.
5. Adjustable belt tension facilities should be installed in order to avoid repeated cutting of band wheel belts.
6. A positive spooling device on the bull wheel shaft should be used so as to prevent damage to the drilling line caused by uneven spooling.
7. Improved bull wheel brakes should be devised—possibly a steel brake drum with a molded lining brake shoe cooled by circulating water.

Recent Developments in Method of Plugging Off Bottom Hole Water in the Arbuckle Lime Horizon

By J. N. MILES
Cities Service Oil Company

Investigation and experimental work has resulted in a new practice in cementing of the bottom-hole water section in Arbuckle lime wells. The new procedure involves use of acid to increase the permeability in the water zone, facilitating introduction of a body of cement into the formation. In this manner a permanent and effective plug is formed.

Advantages claimed for this system are that expense is considerably lower than other methods, and that it has proven more successful. Its basic features are use of acid to increase permeability and porosity in the water producing zone, and low pressure placement of cement into the zone opened by the acid. The procedure as now employed has been revised somewhat from that used on the original jobs in order to overcome some difficulties encountered and to expedite the work by reducing the number of tubing pulling jobs. One change found desirable is use of a specially-designed and constructed insert-type hydraulic gun for jetting acid against the formation in order to clean cement sheath from the face of the pay.

The procedure as development and now employed is as follows:

1. Rods and tubing are pulled. A steel

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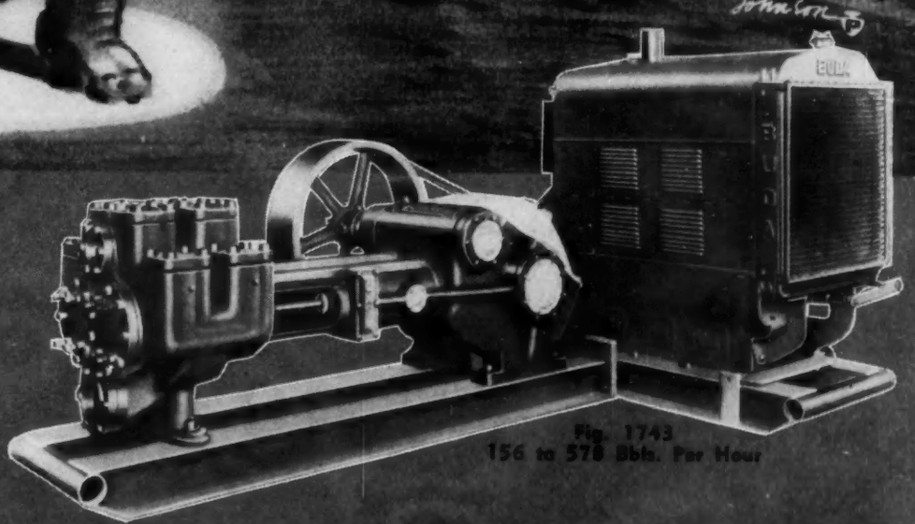

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line is run to determine the total depth; if necessary, a sand pump should be run and the hole cleaned out. Arrangement is made for fixing the hydraulic gun and tubing is run back into the well.

2. By filling the casing and tubing with water the rate of intake of water into the formation is obtained. It is found that the more swiftly a formation will take water, the less acid is generally required for the operation.

3. Acid is then run in amounts varying from 500 to 1000 gallons.

4. The fluid is allowed to recede to a point near its static level. A batch of cement, not exceeding 15 sacks, is mixed with 16-pound slurry and displaced through the tubing with fresh water at a velocity of about 100 feet per minute.

Certain examples were given by the author to illustrate results of this method of treating. Specific data on each job was made available for quick comparison and study.

PIPE LINE NEWS

Schedule Appalachian Gas Measurement Short Course

Preliminary plans for the third annual Appalachian Gas Measurement Short Course, to be held August 19 to 21 at the University of West Virginia, Morgantown, were made by a committee of gas company and manufacturers' representatives meeting with university officials in Morgantown recently.

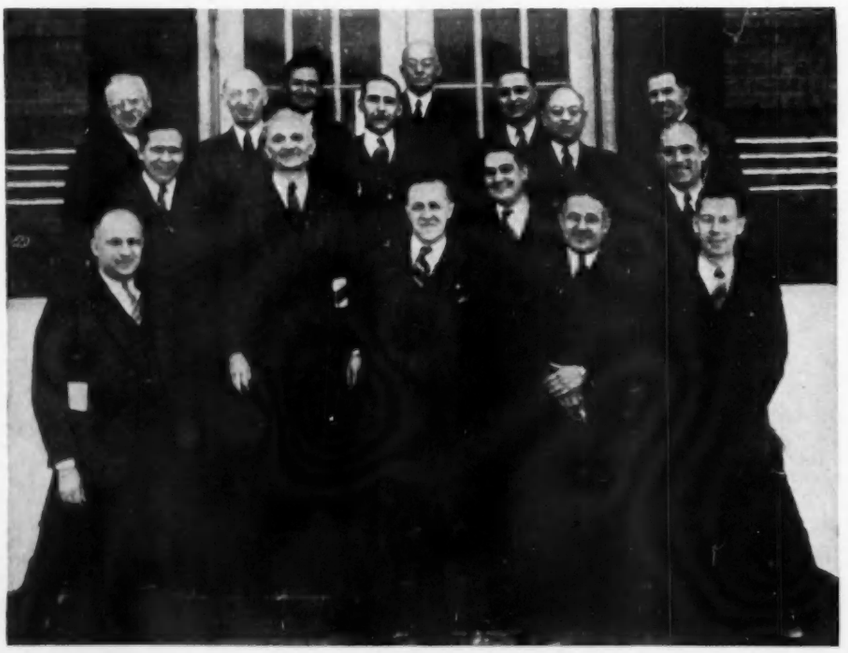
Subcommittees to arrange details of the school were appointed with the following as chairmen:

Program, B. P. Stockwell, West Virginia Public Service Commission; housing and registration, W. A. Staab, University of West Virginia; banquet and entertainment, A. D. MacLean, Pittsburgh Equitable Meter Company; exhibits, J. W. Allison, Monongahela West Penn Public Service Company; publications and publicity, R. S. Reed, Jr., Pittsburgh Equitable Meter Company; rules, R. O. Borden, American Meter Company; practical methods committee on Report No. 1, "Testing Positive Displacement Meters in the Field," J. E. Overbeck, Columbian Engineering Corporation; practical methods committee on Report No. 2, "Testing Orifice Meters," A. K. Kraus, Peoples Natural Gas Company; educational, H. J. Wagner, West Virginia Public Service Commission.

Attending the meeting were W. A. Ehlers, Reynolds Gas Regulator Company, G. R. Spindler, University of West Virginia; Edwin Robinson, West Virginia Oil & Natural Gas Association; E. M. Lockwood, Sprague Meter Company; C. B. Heist, Manufacturers Light & Heat Company; J. R. Sproat, Pittsburgh Equitable Meter Company; R. W. Hitchman, United Fuel Gas Company; T. K. Spalding, Owens-Libby - Owens Company, Stockwell, Staab, MacLean, Allison, Borden, Kraus and Wagner.

Magnolia lets contract for 57 miles of 8-inch loops

Magnolia Pipe Line Company will install a series of loops along its Mirando-Luling district to Beaumont trunk line to increase capacity from 23,000 to 30,000 barrels daily. Contract has been awarded Williams Brothers Corporation for laying 5 loops, aggregating 57 miles of 8-inch pipe, parallel to the original carrier at intervals from Sealy station, Austin County, to Beaumont. Congestion has developed on this portion of the line, which has been in service since 1924, due to increased crude runs from the West Ranch field, Jackson County. The latter field was connected last October with a 73-mile 8-inch extension from Sealy station.



The general committee arranging the third annual Appalachian Gas Measurement Short Course is pictured during a recent meeting held in Morgantown, West Virginia. In the front row, from left to right, are R. O. Borden, R. W. Hitchman, Allen D. MacLean and T. K. Spalding; second row, left to right, are C. B. Heist, A. F. Kraus, J. R. Sproat and H. J. Wagner; top row, left to right, are W. A. Ehlers, J. W. Allison, G. R. Spindler, Edwin Robinson, W. A. Staab and E. M. Lockwood.

Sinclair completes second K-M-A and Hull-Silk outlet

Sinclair Refining Company will place in operation early this week an 8-inch trunk line to serve the K-M-A and Hull-Silk fields, North Texas. The line parallels a 66.4-mile 6-inch carrier completed last May from the company's K-M-A field station, NEc Block 39, P. Castleman Survey, Wichita County, thence southeast across Archer County, to Hensley junction, Jack County, where a tie-in is made with the company's Oklahoma - Houston multiple system.

Construction contractor finished welding work on the new unit late last week, using a single crew of welders who made their first weld on February 7. The two K-M-A outlets will have a combined capacity of 23,000 barrels daily, but can be materially increased by hooking up an intermediate station.

Magnolia authorizes two projects in North Texas

Magnolia Pipe Line Company has authorized two minor pipe line projects to improve its service for outside connections in North Teaxs areas. The company is laying a 5-mile 4-inch line from Mankins station, SEc E.T. Ry. Section 2, A-1200, Archer County, thence east to the Hull-Silk field. This unit will tie into a field booster station near C N½ of Abner Nails Survey, A-325, and will supplement a 3-inch field outlet built early last year.

In the Thornberry shallow district, northwestern Clay County, the company will erect a booster station on its Burkburnett-Fort Worth 8-inch carrier, and rearrange its field gathering lines so as to deliver oil to the central point. This will displace a series of feeder lines that have been pumping against rising pressure on the trunk line, now operating near capacity.

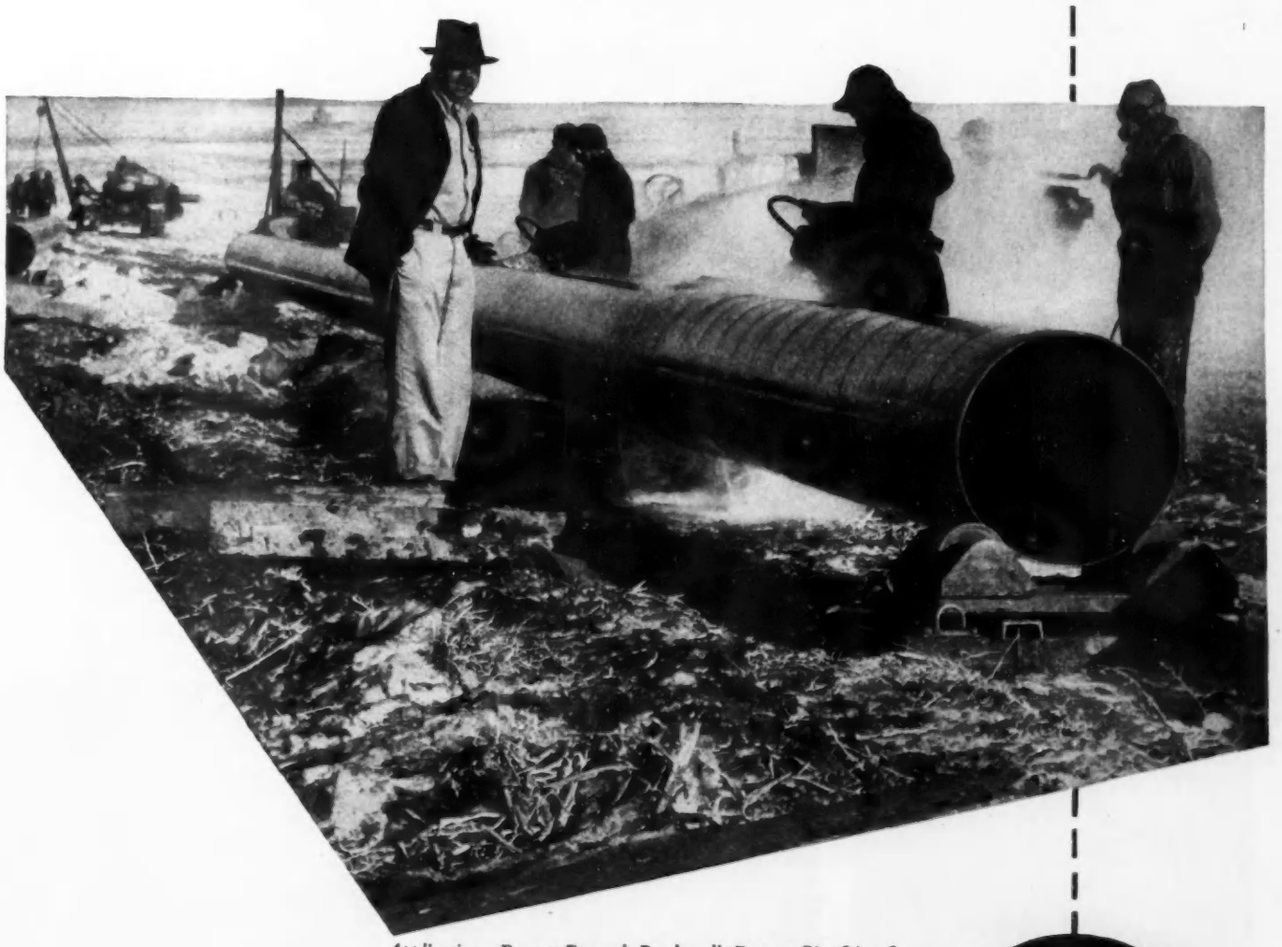
New Mexico Eastern builds 24-mile gas line

New Mexico Eastern Gas Company, subsidiary of the Southern Union Gas Company, Dallas, is building a 24-mile extension to its natural gas system in Eddy County, New Mexico, from a point near Loving to a group of potash plants on the east border of the Pecos River Valley. The line will use 10 miles of 6-inch and 14 miles of 4-inch welded pipe, and will handle 6,000,000 feet of gas daily. It is due to be placed in operation late this month.

Bonita pool outlet placed in operation

Initial crude runs were made March 11 on Sinclair Refining Company's 7.3-mile 6-inch extension from the Bonita pool, eastern Montague County, to a point immediately east of Nocona where connection is made with the Oklahoma-Houston system.

LAYING PIPE IN ZERO WEATHER



Application—Barrett Enamel. Panhandle Eastern Pipe Line Co.

PANHANDLE EASTERN PIPE LINE COMPANY'S construction program this year demands out-of-season work under adverse winter conditions. But Barrett Enamels, designed to overcome unusual obstacles, performed faultlessly. Not a foot of pipe . . . no coatings on Dresser couplings, lost because of cold weather. Again Coal-Tar Pitch, of which Barrett Enamels are made, proves itself the most stable of known bituminous substances. And again Barrett skill in manufacturing and careful Barrett supervision in the field illustrate two of the many reasons farsighted engineers specify Barrett Enamels.

THE BARRETT COMPANY 40 Rector Street, New York, N. Y.

Barrett
PIPELINE
ENAMEL

BARRETT SERVICE With Barrett Field Service assistance and rigid inspection, The Barrett Company provides a unique follow-through to assure the best possible results from Barrett protective coatings. Inquiries are invited.

Southwestern and Eastern A.P.I. Production Programs

TECHNICAL and operating problems in oil production will be covered in papers to be presented before two district meetings of the Division of Production, American Petroleum Institute, scheduled for the next few weeks.

Programs were announced last week for spring meetings of the Southwestern District, to be held in Houston March 28 and 29, and for the Eastern District, to be held in Columbus, Ohio, April 11 and 12.

Among subjects to be discussed before the Southwestern District will be gravel packing, paraffin removal, artificial lift, electric logging, core analysis and causes and prevention, and recovery of stuck drill pipe.

Members of the Eastern District will be welcomed by Governor John W. Bricker of Ohio, and will hear papers on conservation, water treatment for prevention of scale and corrosion, oil

Program For Southwest District A.P.I. Meeting
Houston—March 28-29

THURSDAY MORNING, MARCH 28

Presiding:
L. A. Ogden, The Pure Oil Company, Fort Worth, and M. G. Cheney, Anzac Oil Corporation, Coleman, Texas.

Address of Welcome:
A. Dee Simpson, National Bank of Commerce, Houston.

Response:
E. P. Hubbard, Gulf Oil Corporation, chairman, Southwestern District, Houston.

Chapter Activities:
By officers of various Southwestern District Chapters.

Gravel Packing Oil Wells in the Gulf Coast Fields:
M. L. Cashion and F. B. Markle, Gulf Oil Corporation, Houston.

Paraffin Removal From Tubing in Flowing Wells:
J. Daviss Collett, Jr., consulting petroleum engineer, Houston.

THURSDAY AFTERNOON, MARCH 28

Presiding:
E. P. Hubbard, Gulf Oil Corporation, Houston.

Address:
W. B. Pyron, vice president, Gulf Oil Corporation, Houston.

The Development of Our Changing Concepts of the Fundamentals of Oil Production:
E. DeGolyer, Dallas.

Supervisory Training in the Oil Industry:
H. H. Anderson, vice president, Shell Oil Company, St. Louis.

THURSDAY EVENING, MARCH 28

Informal Entertainment:
At the Houston Club, courtesy of the Houston Oil Fraternity.

FRIDAY MORNING, MARCH 29

Presiding:
R. O. Garrett, Arkansas Fuel Oil Company, Shreveport, and S. E. Buckley, Humble Oil & Refining Company, Houston.

Artificial Lift Methods in the Rodessa Field:
B. J. Dowd, Union Producing Company, Vivian, Louisiana.

Oil Development and Production Practices on the Gulf Coast:
G. B. Corless, Humble Oil & Refining Company, Houston.

Causes, Prevention and Recovery of Stuck Drill Pipe:
J. E. Warren, Carl B. King Drilling Company, Dallas.

Election of Officers and Advisory Committee.

FRIDAY AFTERNOON, MARCH 29

Presiding:
Harold Vance, department of petroleum engineering, A. & M. College of Texas, College Station, Texas, and J. P. Straight, Cities Service Oil Company, Gladewater, Texas.

Limitations of Electrical Logging:
J. Zaba, Rio Bravo Oil Company, Houston.

A Comparison Between Electrical Well Logging and Core Analysis:
P. B. Leavenworth, Gulf Oil Corporation, Houston.

Gun Perforation and Acidization in Open Formation of the Limestone Pays in the Permian Basin:
J. A. Jones, Lane-Wells Company, Odessa, Texas.

FRIDAY EVENING, MARCH 29

Dinner Dance:
At Rice Hotel.

E. P. HUBBARD
Chairman,
Southwestern District,
American Petroleum Institute.

L. A. OGDEN
Program Committee Chairman,
Southwestern District,
American Petroleum Institute.

T. E. SWIGART
Arrangements Committee Chairman,
Southwestern District,
American Petroleum Institute.

property appraisals, deep cable tool drilling, electric logging, multi-sand completions, geology and development of the Illinois Basin, and new developments, procedures and methods in drilling and completing wells.

Officers

Officers of the Southwestern District are E. P. Hubbard, Gulf Oil Corporation, Houston, chairman; R. L. Carruthers, Sun Oil Company, Beaumont, vice chairman for Gulf Coast; Harold Decker, Seaboard Oil Company, Corpus Christi, vice chairman for Southwest Texas; L. A. Ogden, The Pure Oil Company, Fort Worth, vice chairman for North and West Texas; T. W. Johnson, Union Producing Company, Shreveport, vice chairman for Arkansas and North Louisiana; C. G. Staley, Lea County Operators' Committee, Hobbs, vice chairman for New Mexico; J. P. Straight, Cities Service Oil Company, Gladewater, vice chairman for East Texas; J. U. Teague, Hogg Oil Company, Houston, secretary-treasurer, and W. S. Morris, East Texas Engineering Association, Kilgore, advisory committee chairman.

Officers of the Eastern District are D. T. Ring, The Preston Oil Company, Columbus, Ohio, chairman; W. A. Watkins, The Carter Oil Company, Mattoon, Illinois; T. H. Myers, Carnegie Natural Gas Company, Pittsburgh; J. J. Schmidt, East Ohio Gas Company, Cleveland; J. A. Thompson, Belmont Quadrangle Drilling Corporation, Bradford, Pennsylvania, and O. W. Van Petten, Columbian Carbon Company, Charleston, West Virginia, vice chairman, and I. W. Hartman, Gordon Oil Company, Mt. Pleasant, Michigan, secretary-treasurer.

Program Committees

L. A. Ogden, The Pure Oil Company, Fort Worth, is chairman of the program committee for the Southwest District meeting. Assisting him are S. E. Buckley, Humble Oil & Refining Company, Houston; M. G. Cheney, Anzac Oil Corporation, Coleman, Texas; R. O. Garrett, Arkansas Fuel Oil Company, Shreveport; F. E. Heath, Sun Oil Company, Dallas; J. P. Straight, Cities Service Oil Company, Gladewater, Texas, and Harold Vance, A. & M. College of Texas, College Station.

J. J. Schmidt, East Ohio Gas Company, Cleveland, heads the program committee for the Eastern District meeting. He is being assisted by Gordon M. Gulley, Gulf Oil Corporation, Pittsburgh, and W. A. Watkins, The Carter Oil Company, Mattoon, Illinois.

Arrangements Committees

T. E. Swigart, Shell Oil Company, Houston, is chairman of the arrangements committee for the Southwestern District. Assisting him are E. P. Hubbard, Gulf Oil Corporation; Gordon Richmond, Hughes Tool Company; J. U. Teague, Hogg Oil Company; Mrs. Chase Sutton, and Warren L. Baker, THE OIL WEEKLY, all of Houston.

W. E. Ferguson, Ohio Fuel Gas Company, Columbus, Ohio, is chairman of the arrangements and entertainment committee for the Eastern District. He is being assisted by E. V. O'Rourke, Ohio State University, and Lester Woltz, Oil Well Supply Company, both of Columbus.

A special committee on ladies entertainment has been named for the Southwestern District meeting. Under the chairmanship of Mrs. Chase Sutton, members are Mrs. R. G. Bechtel, Mrs. Morgan Davis, Mrs. Gordon Richmond and Mrs. Floyd Senter.

Program For Eastern District A.P.I. Meeting
Columbus, Ohio—April 11-12

THURSDAY MORNING, APRIL 11

Presiding:
Dewitt T. Ring, The Preston Oil Company, Columbus, Ohio.

Address of Welcome:
Governor John W. Bricker of Ohio.

Conservation and Proration Without Allowables:
Roger C. Hutchings, American Petroleum Institute, New York.

DEWITT T. RING
Chairman,
Eastern District,
American Petroleum Institute.

Water Treatment for Prevention of Scale and Corrosion in Connection with Water Flooding:
F. T. Redman and R. F. Mackie, Hall Laboratories, Pittsburgh.

THURSDAY AFTERNOON, APRIL 11

Presiding:
J. J. Schmidt, The East Ohio Gas Company, Cleveland.

Lubrication of Oil Field Equipment:
H. R. Foster, Lubri-Zol Corporation, Cleveland.

Review of New Developments, Procedures and Methods in Drilling and Completing Wells:
E. A. Shakley, exploitation engineer, Shell Oil Company, Centralia, Illinois.

Appraisal of Oil Properties:
Ralph E. Davis, Ralph E. Davis, Inc., Pittsburgh.

Portable Compressors:
Harvey H. Johnson, Belmont Quadrangle Drilling Corporation, Bradford, Pennsylvania.

THURSDAY EVENING, APRIL 11

Annual Dinner and Entertainment:
At Deshler-Wallick Hotel.

FRIDAY MORNING, APRIL 12

Presiding:
M. G. Gulley, Gulf Oil Corporation, Pittsburgh.

Problems in Deep Cable Tool Drilling, Appalachian District:
J. A. Fox, Foley & Fox, Washington, Pennsylvania.

Crude Oil and Its Competitive Fuels:
Dr. Gustav Egloff, Director of Research, Universal Oil Products Company, Chicago.

Electric Logging:
J. D. Gustafson, Carter Oil Company, Dix, Illinois.

Interesting Developments in Michigan:
George Myers, Sun Oil Company, Toledo, Ohio.

FRIDAY AFTERNOON, APRIL 12

Presiding:
W. A. Watkins, Carter Oil Company, Mattoon, Illinois.

Election of Officers.

Multi-Sand Completions:
Bart DeLaat, Pure Oil Company, Olney, Illinois.

Geology and Development of the Illinois Basin Area:
Dr. A. H. Bell, Oil & Gas Division, Illinois State Geological Survey, Urbana.

Use of A.P.I. Tubular Goods, Appalachian District:
J. B. Graham, National Tube Company, Pittsburgh.

Rejuvenation of Stripper Wells:
H. E. Milliken, Waynesboro, Pennsylvania.

W. E. FERGUSON
Arrangements Committee Chairman,
Eastern District,
American Petroleum Institute.

MEN IN THE INDUSTRY'S NEWS

A. W. McPHERSON, A. E. Carpenter and W. B. Goodwin of California Arabian Standard Oil Company; G. W. van Bilderbeck, Bataafsche Petroleum Maatschappij, The Hague; John M. Russell, Sarawak Oilfields, Limited, Sarawak; K. B. Jauman, Attock Oil Company, Limited, Khaur, Punjab, India; and L. C. Stevens of Caribbean Petroleum Company, Maracaibo, Venezuela, were among the foreign visitors at the March monthly meeting of the Los Angeles Chapter of Nomads, featured by an illustrated lecture on South America by H. W. Patterson of Pan American Airways.

D. W. ELLIOTT, Long Beach, has been elected president of the California Stripper Well Association, succeeding Wilbur Harrison, vice president of Apex Petroleum Corporation. Also named were Robert Davis, A. D. Mitchell and Neal Elder, vice presidents; Robert I. Plomert, secretary-treasurer, and Richard Fenton, executive vice president.

E. G. TROSTEL, engineer for Union Oil Company of California, discussed "Bottom-Hole Pressure as a Basis for Curtailment," and Dr. Thomas Clements, of University of Southern California, spoke on "Geological Reconnaissance in Colombia" before the Los Angeles Basin Chapter of the American Petroleum Institute's Division of Production last week.

FRED W. BATES, Lafayette, Louisiana, discussed "The Eola Oil Field of Avoyelles Parish, Louisiana," before the Houston Geological Society last week.

DORSEY STRAITIFF, president of Rocky Mountain Drilling Company, has returned to his Los Angeles office following a visit to the company's Rocky Mountain division operations.

C. H. TUTTLE, former superintendent of purchase and stores division of Standard Oil Company of Texas, Houston, last week assumed new duties as district purchasing agent for Standard Oil Company of California at Los Angeles.

JOHN CARTER has resigned as vice president of Gem Oil Company, Houston, to operate independently.

DR. W. B. EMEREY, chief geologist for The Ohio Oil Company, Findlay, Ohio, stopped at the company's offices in Casper, Wyoming, when on a recent tour of company properties.

J. J. McCAY, Morgan Haight and Jack A. Gleason, all of Oklahoma City, have organized Southwest Pipe Line Company as an Oklahoma corporation.

F. HOWARD WALSH, an employe of the F.H.E. Oil Company, Fort Worth, has been elected a member of the board of directors. He fills the vacancy occurring through the death of R. A. Elliott last July.

HENRY M. DAWES, president of The Pure Oil Company, in his annual report to stockholders, declared "it seems to me that the oil industry should have a better year in 1940 in spite of the clouds of doubt and uncertainty which hang over the general business situation."

RALPH A. LIDDLE, geologist of Fort Worth, returned to New York March 5 from a three months trip to Ecuador where his time was spent in checking over oil concessions for Pittsburgh interests. He plans to be in New York until shortly after the first of April while preparing his report.

GERALD W. WESTBY, president of Seismograph Service Corporation, Tulsa, spoke before a meeting of the A. I. M. E. at the University of Tulsa March 11 on "Well Logging by the Gamma Ray Method."

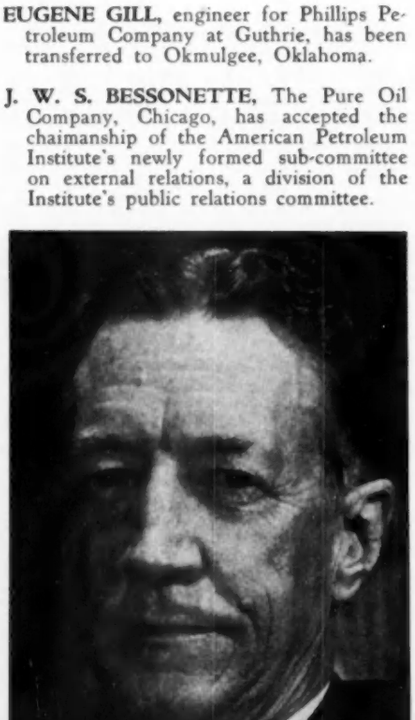
FRED Q. CASLER, Aero Exploration Company, Tulsa, addressed the Tulsa Engineers Club at its noon luncheon March 11, tracing the history of aerial photography.

HAROLD BECWAR, Wisconsin, geologist, is now attached to the geological department of The Texas Company at Corpus Christi.

BOB O. BIRD, superintendent for Phillips Petroleum Company at Guthrie, Oklahoma, has been transferred to Vernon, Texas.

EUGENE GILL, engineer for Phillips Petroleum Company at Guthrie, has been transferred to Okmulgee, Oklahoma.

J. W. S. BESSONETTE, The Pure Oil Company, Chicago, has accepted the chairmanship of the American Petroleum Institute's newly formed sub-committee on external relations, a division of the Institute's public relations committee.



J. W. S. BESSONETTE
Chairman, A.P.I. Sub-Committee on External Relations.

C. F. DILLINGHAM, Alma, Oklahoma; Raymond P. Locke, Dallas, and L. S. Dillingham, Muskogee, Oklahoma, last week organized the Dillingham-Loche Oil Corporation with headquarters in Ardmore, Oklahoma.

GEORGE BEVIER recently established his office in San Antonio. He was formerly geologist and geophysicist for The Pure Oil Company at Houston.

HENRY LEY, San Antonio, president of the American Association of Petroleum Geologists, was guest last week of the South Texas Geological Society at its regular luncheon meeting at Corpus Christi. Ley discussed business affairs of the national society.

HUGH D. DRISCOLL has been elected president of Gulf Stream, Inc., Houston, succeeding the late H. D. Driscoll. Walter G. Dodd has been named executive vice president and general manager, and A. D. Dyess has been elected secretary.

FRANK C. PHILLIPS, Phillips Petroleum Company, Bartlesville, will become a member of Delta Sigma Pi, international commerce fraternity, and will be the principal speaker at a formal banquet following the initiation ceremony at the University of Oklahoma April 4.

MALVIN G. HOFFMAN, chief geologist for Midco Oil Corporation, Tulsa, discussed "The Structural History of the Billings Field Interpreted in Terms of Isostasy" before the Oklahoma City Geological Society last week.

DIED:

JAMES J. MAGUIRE, 65, manager of the marine transportation department of Socony-Vacuum Oil Company, died March 4 at his home in New York.

R. I. HUGHES, 82, pioneer driller in Pennsylvania fields, died March 9 at his home in Franklin.

Texas deputy supervisor fired following bribe charge

Gordon Bigham, who has been deputy supervisor for the Texas Railroad Commission in its Midland office, has been freed on $5000 bond, after being charged with accepting a bribe, according to Railroad Commissioner Jerry Sadler, who investigated the case in Midland last week.

Sadler said that $5000 in marked bills was taken from Bigham as he left the offices of Shasta Oil Company, and that the company had cooperated in an investigation.

The combined forces of the Railroad Commission, Public Safety Commission, and Department of the Interior made the investigation.

Meanwhile, Bigham has been discharged, and W. J. Christian, chief enforcement officer from East Texas, and Stanley Bean, investigator, had been assigned to the Midland office to supervise activities and continue the investigation, according to Sadler.

ENGINE: WILL TAKE JOB

DRIVING OIL-LINE PUMPS 24 HOURS DAILY

Qualifications:

ENERAL . . .

Known as "Type JS." Four-cycle Diesel. Incor-rates field-proved features of its predecessors ypes JT and JTB) . . . has greater overall iciency, greater economy of operation and intenance, greater horsepower.

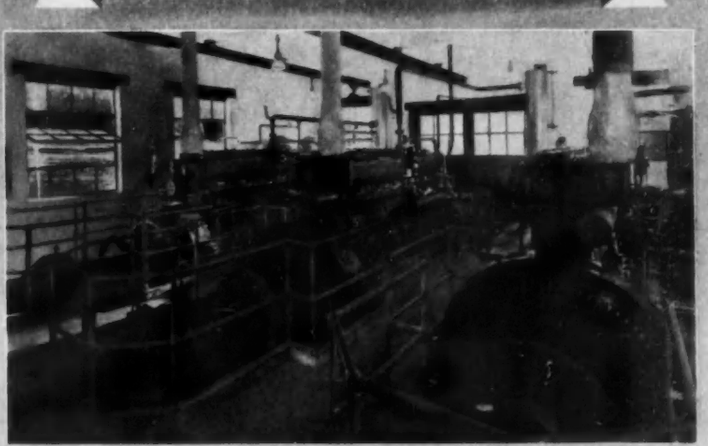
YPICAL FEATURES . . .

- Oil-cooled pistons.
- Full pressure lubrication.
- Individual cylinder heads.
- Precision-type camshaft bearings.
- Full pressure lubricated camshaft.
- Smooth, easily kept-clean exteriors.
- Rugged, though compact, construction.
- Removable, precision-type bearings.
- Dependable power — ample reserve.
- Compact, space-saving design.
- Most auxiliaries built in.
- Economical fuel system.

P RATINGS . . .

Built in 5, 6, 7, and 8-cylinder units, covering a nge of from 430 to 675 horsepower at con-rvative speeds. ***Further details gladly pplied on request.***

TYPE JS



DEPENDABLE! Seven, 340 hp, Type JT 6-cylinder Diesels, installed in three separate stations, drive electric generators on an oil line in East Texas. (The new Type JS is an even better Diesel!)

THE COOPER-BESSEMER CORPORATION

Mount Vernon, Ohio — PLANTS — Grove City, Penna.

25 West 43rd St., New York City — 201 East 1st St., Tulsa, Okla. — Box 1586, Pampa, Texas — Magnolia Building, Dallas, Texas
Investment Bldg., Washington, D. C. — 631 Spring St., Shreveport, La. — Box 454, Greggton, Texas — P. O. Box 66, Corpus Christi, Texas
529 M & M Building, Houston, Texas — 640 East 61st St., Los Angeles, Calif. — 1501 Arcade Building, St. Louis, Missouri

Nomads to Entertain Foreign Exposition Visitors

HOUSTON, Los Angeles and Tulsa chapters of the Nomads are cooperating with the 1940 International Petroleum Exposition in making plans to care for international visitors who attend the oil show May 18-25.

Members of the Tulsa Nomads chapter recently assisted in ground-breaking ceremonies for the new International delegates building on the exposition grounds. This building will serve as headquarters during the exposition for Delegates and visitors from other nations, and members of the three chapters will act as hosts in the building.

The International Delegates building was donated by the late W. R. Braden, of the Braden Steel Company, who was a member of the Tulsa Nomads chapter.

An international banquet will be held during the exposition. Plans are being formulated by a committee under the chairmanship of Alf G. Heggem, vice president of the exposition. Nomads serving on this committee are: Houston chapter, Rex Hamaker, Reed Roller Bit Company, and Bill Gross, The Oil Weekly; Los Angeles chapter, Ted Sutter, Baker Oil Tools, and George MacDonnell, California Oil World, and Tulsa chapter, C. O. Willson, The Oil & Gas Journal, and Clarence Morris, Petroleum Engineer, Dallas.

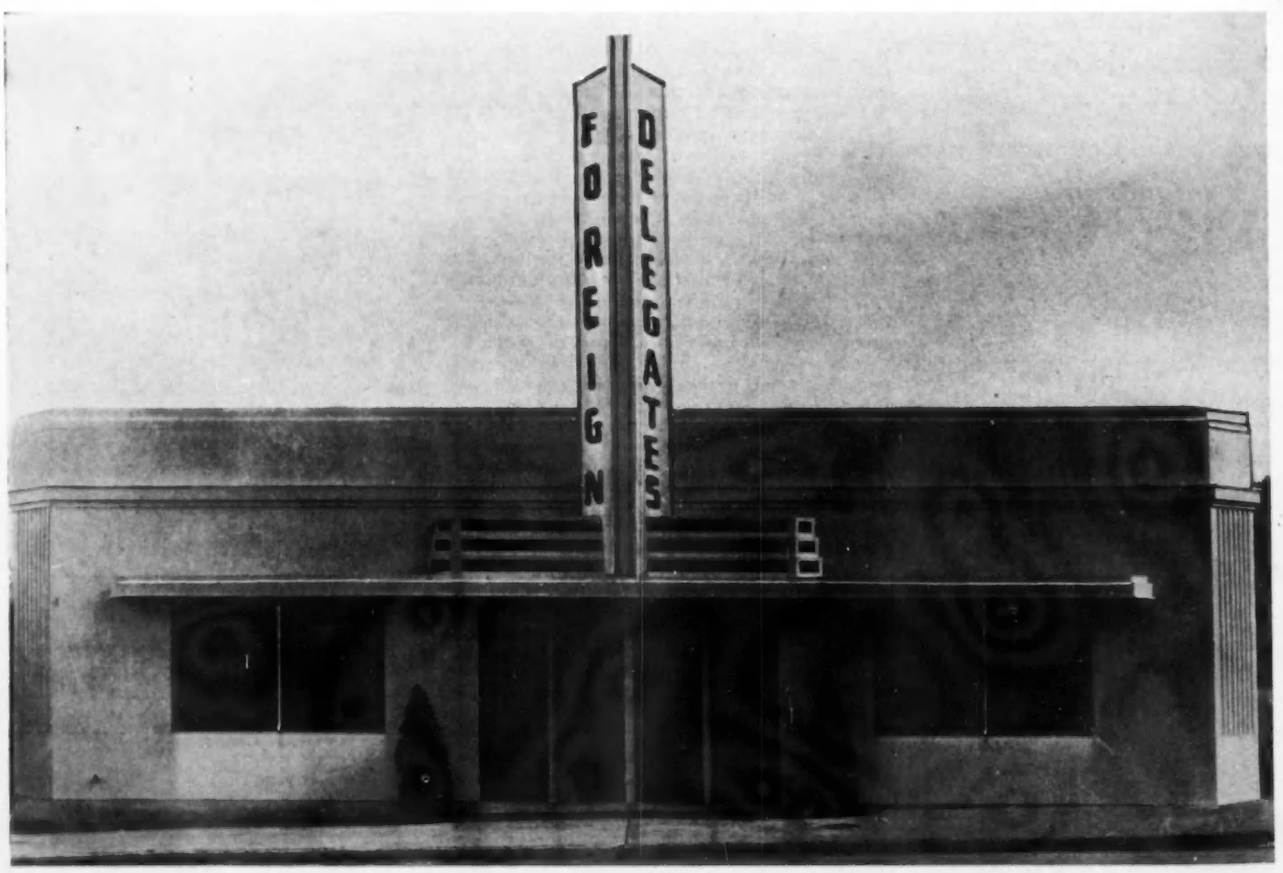
The greatest international attendance in the history of the exposition is expected by oil show officials, with more than 12 nations already having reported that they will send delegates. Numerous additional reservations have been received from individuals in other countries.

Three committees for international delegates have been set up for the 1940 exposition, in place of the usual one for previous oil shows. More than 25 nations are expected to be represented this year. Eighteen nations had delegates at the 1938 Tulsa oil show.

Barton A. Myers, director, International Petroleum Company, Ltd., Toronto, will head the international attendance committee; Heggem is chairman of the committee on arrangements for the banquet and other events, and James H. Gardner, Tulsa, is in charge of the international delegates committee.

Two registration bureaus are planned for the convenience of international visitors. One of these will be located on the exposition grounds in the new international delegates building, while the other will be in downtown Tulsa. Nomads club members will be in charge at both locations.

Transportation will be provided by the exposition for international delegates. Cars will be available both on the grounds and at the downtown bureau to take them to any desired destination. In addition, tours are being planned to allow the visitors from other nations to inspect oil fields and refineries in and near Tulsa.



This International Delegates building, now being constructed on the grounds of the 1940 International Petroleum Exposition in Tulsa, will serve as headquarters for visiting delegates from other nations during the May 18 to 25 oil show. Members of the Houston, Los Angeles, and Tulsa chapters of the Nomads will serve as hosts in the building.

WORTHINGTON EQUIPMENT provides COMPLETE COVERAGE

For every important operation . . . at every important step

IN THE PETROLEUM INDUSTRY

The increasing acceptance of Worthington products has been established on the solid basis of consistent performance over a wide range of exacting applications.

There is a Worthington unit to meet every condition exactly . . . without compromise in selection.

Production • Transportation • Refining

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WORLD WIDE SERVICE

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY**

District offices in every important city in the United States

Representatives or Branch Offices in

ARGENTINA AUSTRALIA BELGIUM BRAZIL CANADA
COLOMBIA ENGLAND FRANCE HOLLAND HUNGARY
INDIA ITALY PERU ROUMANIA SOUTH AFRICA
SPAIN SWEDEN TRINIDAD TURKEY VENEZUELA

and other territories

WORTHINGTON

Markets generally steady despite high crude output

The markets continue generally steady, although the crude price structure is under some pressure from overproduction.

Prices of refined products, in the aggregate, have not shown material change in the past 10 days, as some sagging of the light fuel oils has been compensated by advances of quotations for kerosene.

The gasoline market is marking time, being now near the turning point of spring's beginning, when consumption normally begins to expand seasonally and cause withdrawals from stocks instead of additions.

Prices of gasoline at Mid-Continent refineries and in the marketing area of the Middle West have held steady in the past several weeks, although quotations have been lowered by some sellers on the Atlantic seaboard.

Natural gasoline remains in poor demand, and quotations have been lowered to around 1½ cents a gallon in North Texas, while continuing around the extremely low level of 2 cents in the upper Mid-Continent.

Demand Encouraging

Encouraging was the latest monthly report of the Bureau of Mines on petroleum, issued last week, as it showed remarkably good demand in January for practically all products, including gasoline, despite curtailed exports. The exceptionally large domestic demand made total demand figures materially larger than those of January, 1939, despite the sharp curtailment of foreign shipments.

Total demand for gasoline was 3 percent greater for January, 1940, than for the initial month of 1939. Domestic consumption was up by the remarkably large margin of 7 percent, to 40,370,000 from 37,767,000 barrels in January, 1939. But exports were off sharply, from 3,638,000 barrels in January, 1939, to 2,274,000 barrels in January, 1940, a decrease of 38 percent. Aviation gasoline, as well as other gasoline, was exported in reduced quantity.

The Bureau of Mines described as sensational the fuel oil demand for January, as the markets absorbed 34 percent more gas oil and fuel oil than in the first month of last year, while kerosene demand was up 31 percent and residual fuel oil demand 13 percent. These large gains in total demand occurred despite smaller exports of each of the three products.

PRODUCT PRICES

	Range Late Last Week (Cents a gal.)		Changes from Week Before	
REFINED GASOLINE				
Oklahoma Refineries:				
62 Octane and under	3¾	4⅛	...	...
63-66 Octane	4	4⅜	...	...
67-69 Octane	4	4⅜	...	...
70-72 Octane	4¼	5	...	...
Mid-Western Tank Car:				
62 Octane and under	3¾	4⅛	...	...
63-66 Octane	4	4⅛	...	...
67-69 Octane	4¼	4¾	...	...
70-72 Octane	4½	5	...	...
NATURAL GASOLINE				
Grade 26-70:				
F. O. B. Group 3	2	...	...	...
F. O. B. Breckenridge, Texas	1½	...	—¼	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	3¾	4¼	...	...
42-44 water white	3¾	4⅝	...	...
Mid-Western Tank Car:				
41-43 water white	3⅞	4¼	+⅛	...
42-44 water white	4	4⅝	+⅛	...
FUEL OILS				
Mid-Western Tank Car:				
Range Oil	3¾	4	...	...
Gas and Fuel Oils:				
No. 1 Prime White	3⅝	3⅞	—⅛	...
No. 1 straw	3½	3⅝	...	—⅛
No. 2 straw	3⅜	3½	...	—⅛
No. 3	3¼	3⅜	...	—⅛
No. 5 (per bbl.)	65	70	...	...
No. 6 (per bbl.)	50	55	...	...

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1937:						
August 28	[5]3,731,450	3,425,000	309,506,000	66,997,000	112,111,000	
September 25	3,666,300	[5]3,455,000	307,974,000	65,620,000	116,472,000	
1938:						
March 19	3,433,550	3,080,000	306,380,000	[5]93,192,000	122,067,000	
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	29,082,000	115,741,000
1939:						
January 28	3,248,250	3,235,000	271,763,000	77,279,000	26,583,000	112,766,000
February 25	3,328,850	3,185,000	271,758,000	84,597,000	23,419,000	110,252,000
March 25	3,382,350	3,225,000	273,915,000	87,561,000	21,487,000	107,551,000
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
May 27	3,585,250	3,405,000	278,289,000	84,152,000	29,992,000	109,386,000
June 24	3,452,800	3,430,000	272,297,000	81,733,000	30,239,000	111,726,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[9]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[1]3,650,000	[2]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 3	3,498,800	3,395,000	239,380,000	89,337,000	26,861 000	102,536,000
February 10	3,688,100	3,460,000	239,510,000	91,649,000	26,007,000	102,344,000
February 17	3,717,950	3,570,000	238,928,000	93,985,000	25,876,000	103,424,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 2	3,798,250	3,445,000	244,126,000	98,364,000	25,015,000	103,521,000
March 9, 1940	3,828,550	3,450,000	.....	[3]99,397,000	24,560,000	103,825,000
March 11, 1939	3,353,000	[8]3,191,000	[4]272,971,000	85,964,000	27,906,000	111,560,000
Change in past year	+14.1%	+8.1%	—10.6%	+15.0%	—12.0%	— 6.9%

[1] All time peak. [2] Peak for 1939. [3] Lowest since April, 1922. [4] Stocks, March 4, 1939. [5] Peak prior to 1939. [6] Lowest for year. [7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California. [8] March, 1939, daily average. [9] Lowest since October 1922, due to the shutdown of six Mid-Continent states.

Yields Regulated

Also encouraging was the evidence that the industry made a serious effort in January to adjust yields of the various products into conformity with the prevailing trends of consumption of those products, even if it did prove impossible to avoid a further large accumulation of gasoline in storage.

Whereas the yield of gasoline for the country as a whole was 45 percent in December, it was cut to 42.9 percent in January. Meanwhile, the yield of gas oil and distillate fuel was raised from 13.6 percent in December to 15.5 percent in January, in recognition of the exceptionally large market demand for the light oils for heating purposes. The yield of residual fuel oil was increased at the same time from 25.5 to 26.4 percent.

Kerosene Shows Strength

Advances of ⅛ cent a gallon in quotations for kerosene by some Middle Western marketers and refiners last week reflected the expectations of early expansion of demand, because of spring agricultural activity. In Oklahoma and Kansas, too, some refiners advanced their tank car quotations on kerosene from ⅛ to ¼ cent a gallon. Throughout most of the country, supplies of kerosene were found by prospective buyers to be relatively scarce. Some refiners faced the possibility of being obliged to go into the open market to supplement their own plant output of that product.

Fuels and Lubricants

The past week brought some further lowering of quotations on both light and heavy fuel oils. On the Gulf Coast, there were reports that in some instances, prices asked for Bunker C fuel oil for cargo lots had been lowered 10 cents a barrel.

The markets for lubricants have continued quiet, although it is anticipated that demand soon may show improvement, as spring advances. In some cases, nevertheless, bright stocks and neutral oils have been marked down another 1 cent a gallon or so by Pennsylvania and Mid-Continent refiners in efforts to obtain business.

Large crude output chief flaw in oil statistics

Statistics of the industry lately have been featured by large production of crude oil, which has come to cause more concern than relatively high crude runs to stills.

The nation's crude output jumped 30,000 barrels more in the week ended March 9, having averaged 3,828,550 barrels daily, according to the American Petroleum Institute. That was 14.1 percent more than the production in the corresponding week last year, and only 80,000 barrels a day less than the all-time record output of the first week of August, 1939.

Crude runs to stills were increased 5000 barrels to 3,450,000 barrels daily in the week of March 9. That rate was comparatively moderate, having exceeded the March, 1939, daily average 8.1 percent. Demand for petroleum products in the aggregate probably is running around 5 percent higher this year than last year.

Gasoline Situation

Production of gasoline was 325,000 barrels greater in the week ended March 9 than in the preceding 7 days, as output expanded to 11,460,000 barrels.

Gasoline stocks increased somewhat less than in the previous week, having risen 1,033,000 barrels to 99,397,000 barrels. That new peak was 15 percent above the level at which the stocks stood on March 11 last year, the total on hand then having been 85,964,000 barrels. The 13,500,000-barrel gain over a year ago is largely surplus gasoline, as stocks were excessive last spring and since then demand has increased only around 5 percent.

Stocks of gas oil and distillate fuel again were drawn upon in the week of March 9, having been lowered 455,000 barrels to the 24,560,000-barrel level. The present supply of light fuel oil is about 12 percent smaller than that held a year ago, whereas demand has been materially greater.

Stocks of residual fuel oil, in contrast, are increasing. They rose 304,000 barrels in the week of March 9, as industrial activity continued at somewhat reduced levels. The inventory of 103,825,000 barrels on hand at the end of the week was about 7 percent smaller than that held a year earlier.

Crude oil stocks increased sharply, from 240,836,000 barrels on February 24 to 244,126,000 barrels on March 2, an extraordinary gain of 3,290,000 barrels. That large addition reflected primarily the liberalizing of allowables in Texas, two-thirds of it having represented the backing up of crude in storage in that state. Crude went to storage in all sections of the state, but the outstanding component of the 2,288,000-barrel gain in Texas stocks was the increase of 1,196,000 barrels in East Texas. Arkansas and California each added a quarter of a million barrels, and the remainder of the accumulation was distributed over the country. Crude was taken out of storage, however, in the Appalachian region and also in the Illinois-Indiana area. Small withdrawals occurred also in Kansas, on the Louisiana Gulf Coast, and in the Rocky Mountain States.

January crude production declines from all-time peak

Two months of declining production brought crude petroleum output down from the record high daily average of 3,729,600 barrels in November to 3,649,700 barrels in January, it was reported March 13 by the United States Bureau of Mines.

January production, however, while 53,800 barrels under that of December, still was at the highest level ever attained for the first month of the year and 334,000 barrels above the average for the same month a year ago. Total production for the month was 113,140,000 barrels, compared to 114,810,000 barrels in December and 102,490,000 barrels in January, 1939, the bureau announced.

Production in almost every state declined in January, the notable exceptions being Illinois, Louisiana and Mississippi, the report showed. Illinois production rose about 25,000 barrels daily over December to a new peak of 371,000 barrels. Oklahoma and Texas showed material declines, but California output continued steady at just above 600,000 barrels in line with the experience of the past year or so, in which variation between the state's high and low has hardly exceeded 2 percent.

Crude runs to stills were reported at 3,436,000 barrels a day, 22,000 barrels above the December figure. This gain in refinery runs, combined with the temporary lull in output, the report pointed out, was reflected in crude stocks, which increased less than 1,000,000 barrels, compared with a gain of

United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (March)	State Allowable in March	BARRELS DAILY FOR WEEK ENDED Mar. 16	Mar. 9
TEXAS—				
Texas Panhandle	.....	.....	79,600	79,500
North Texas	.....	.....	106,700	105,650
West Central Texas	.....	.....	33,600	34,000
West Texas	.....	.....	273,600	253,600
East Central Texas	.....	.....	80,250	79,600
East Texas Field	.....	.....	407,600	484,100
South Texas	.....	.....	257,050	229,950
Texas Gulf Const	.....	.....	259,300	238,950
Total Texas	1,330,600	1,490,370*	1,497,700	1,505,350
CALIFORNIA—				
Long Beach	.....	.....	45,800	45,400
Midway-Sunset	.....	.....	59,400	61,200
Kettleman Hills	.....	.....	47,300	43,900
Wilmington	.....	.....	85,000	81,500
Others	.....	.....	383,900	384,000
Total California	587,100	592,000†	621,400	616,000
OKLAHOMA—				
Oklahoma City	.....	.....	93,950	103,250
Seminole Area	.....	.....	100,050	104,600
Others	.....	.....	222,375	219,000
Total Oklahoma	420,300	420,300	416,375	426,850
ILLINOIS—				
Salem	.....	.....	264,800	259,475
Louden	.....	.....	75,500	71,125
Other New Pools	.....	.....	79,750	76,250
Old Pools	.....	.....	9,450	7,175
Total Illinois	329,700	.....	429,500	414,025

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (March)	State Allowable in March	BARRELS DAILY FOR WEEK ENDED Mar. 16	Mar. 9
LOUISIANA—				
North Louisiana	.....	.....	68,250	69,050
South Louisiana	.....	.....	215,050	212,000
Total Louisiana	253,200	277,412	283,300	281,050
KANSAS	153,900	165,000	176,750	179,300
NEW MEXICO	103,200	114,000	113,750	113,500
EASTERN STATES—				
Pennsylvania Grade	.....	.....	74,300	75,500
Others, Eastern	.....	.....	23,900	24,450
Total Easterm States	104,600	.....	98,200	99,950
MOUNTAIN STATES—				
Wyoming	60,600	.....	69,500	66,500
Montana	15,200	.....	16,750	16,900
Colorado	3,500	.....	3,950	3,950
Total Mountain States	89,300	.....	90,200	87,350
MICHIGAN	64,800	65,000	63,900	63,900
ARKANSAS	65,500	70,000	69,700	69,250
MISSISSIPPI	1,300	.....	8,825	7,425
INDIANA	7,100	.....	10,500	10,950
‡Total 8 Prorated States	2,978,600	3,194,082	3,242,875	3,255,200
Total United States	3,500,600	.....	3,880,100	3,874,900

* Net daily average, allowing for Saturday-Sunday-Wednesday shutdowns in East Texas.
† Recommendation of Central Committe of California Oil Producers.
‡ Texas, California, Oklahoma, Louisiana, Kansas, Michigan, New Mexico, Arkansas.

more than 4,000,000 barrels in December.

The yield of gasoline, which had been giving ground slowly in favor of heating oils, declined materially in January, falling to 42.9 percent from 45 percent in December, and comparing with 44.8 percent in January, 1939. The yield of gas oil and distillate fuel rose from 13.6 percent in December to 15.5 percent the following month, and that of residual fuel oil increased from 25.5 to 26.4 percent.

"The indicated domestic demand for motor fuel opened the new year somewhat higher than anticipated," the report commented, "but exports continued to drop rapidly. The domestic demand was 40,370,000 barrels, or 7 percent above a year ago; exports were 2,274,000 barrels, off 37 percent from a year ago. In spite of the decline in yield and the satisfactory home demand, gasoline stocks rose about 7,500,000 barrels in the finished grades and another 500,000 barrels in unfinished. The total for the two on January 31 was 90,975,000 barrels, or about 11,500,000 barrels more than on hand a year ago.

"The domestic demand for fuel oils was sensational, kerosene being 31 percent above last year, gas oil and distillate fuel up 34 percent, and residual fuel oil up 13 percent."

Production of aviation gasoline totaled only 766,000 barrels during the month as compared with 909,000 barrels in December, it was shown. Exports dropped to 155,000 barrels from 372,000 barrels, but domestic demand increased to 554,000 barrels from 292,000 barrels, and stocks increased from 2,771,000 to 2,828,000 barrels.

Bureau of Labor Statistics figures placed the price index for petroleum products in January at 51.7, compared with 52.5 in December and 50.4 in January, 1939. The crude-oil capacity represented by the report was 4,266,000 barrels, giving an operating ratio of 81 percent, the same as in December, compared with 78 percent in the opening month of 1939.

Details of new supply and demand for the month are shown in the accompanying table.

Decline of production in Illinois foreseen

Some operators at Salem Lake Centralia, Illinois, estimate that they have produced over a third of the Devonian oil under their properties, and that they will pass their production peaks in June, unless some unexpected extensions are uncovered.

A few weeks ago, producers were clamoring for more pipe line capacity. But now in several areas, the operators cannot keep the lines on full schedule.

Some additional Devonian locations will be drilled, but then output likely will taper off, unless something new develops.

Bureau of Mines Report of Supply and Demand of All Oils, January, 1940

(Thousands of barrels)

	January, 1940	December, 1939[1]	January, 1939[1]	January, 1938[2]
New Supply:				
Domestic production:				
Crude petroleum	113,140	114,810	102,490	106,152
Daily average	3,650	3,704	3,306	3,424
Natural gasoline	4,271	4,470	4,264	4,422
Benzol[3]	272	275	185	152
Total production	117,683	119,555	106,939	110,726
Daily average	3,796	3,857	3,450	3,572
Imports:[4]				
Crude petroleum:				
Receipts in bond	286	229	495	109
Receipts for domestic use	1,664	2,099	1,373	1,986
Refined products:				
Receipts in bond	1,441	799	1,048	1,604
Receipts for domestic use	1,321	958	609	479
Total new supply, all oils	122,395	123,640	110,464	114,904
Daily average	3,948	3,988	3,563	3,707
Increase in stocks, all oils	[5]4,324	146	[5]990	11,245
Demand:				
Total demand	126,719	123,494	111,454	103,659
Daily average	4,088	3,984	3,595	3,344
Exports:[4]				
Crude petroleum	4,202	4,656	4,477	5,953
Refined products	6,526	8,557	8,494	7,986
Domestic demand:				
Motor fuel	40,370	43,694	37,767	35,323
Kerosene	7,842	6,613	5,980	5,361
Gas oil and distillate fuels	22,787	17,168	16,963	12,642
Residual fuel oils	32,148	31,436	28,443	25,749
Lubricants	2,054	1,825	1,609	1,471
Wax	125	157	74	115
Coke	689	618	530	535
Asphalt	821	1,414	1,061	1,006
Road oil	132	71	173	252
Still gas	5,522	5,761	5,081	5,227
Miscellaneous	240	206	173	137
Losses	3,261	1,318	629	1,902
Total domestic demand	115,991	110,281	98,483	89,720
Daily average	3,742	3,557	3,177	2,894
Stocks:				
Crude petroleum:				
Refinable in United States	239,794	238,910	272,346	306,937
Heavy in California	13,385	13,330	16,356	15,026
Natural gasoline	4,476	4,421	4,647	4,951
Refined products	262,791	268,109	272,707	249,328
Total, all oils	520,446	524,770	566,056	576,242
Days' supply	127	132	157	172

[1] Preliminary figures. [2] Final figures. [3] From Coal Economics Division. [4] Imports of crude as reported to Bureau of Mines; all other imports and exports from Bureau of Foreign and Domestic Commerce. [5] Decrease.

Exports and Illinois affect crude market

Spot tanker sales of crude oil to France and Great Britain have virtually ceased, according to exporters and tanker crude dealers in Texas.

One exporting company has indicated that the Allies lately have displayed a preference for finished gasoline and burning oils on period contracts, as they feel that breaking out of a real war after the spring thaw might involve bombing of the refineries in those countries. In such event, they would not want any raw crude in their hands, without facilities for processing it.

Major companies are in and out of the spot market for tanker lots of crude, however, and are buying enough to prevent the market from getting soggy.

Crude has been going to storage in large quantities in the past few weeks, particularly in Texas, under liberalized allowables, and the build-up is expected to have an adverse effect on the market. However, it is reported that some large purchasers still are short of some grades of Texas crude and that they welcome the opportunity to add to their stocks.

Normally, at this season of the year, large Canadian refiners enter the Texas markets for several millions of barrels of high gravity crude, especially from East Texas, Conroe, and other fields of that class, to be delivered over the summer months.

But the Canadian buyers currently are evasive when pressed for information as to when they will place such orders. Consequently, it is believed that those purchasers are finding it more advantageous to obtain Illinois crude, and that they may not make large purchases in Texas this spring.

This possibility appears to be confirmed by the continued firmness of the Illinois market, as it is doubted that Middle Western and Eastern refineries are processing all the current production, and yet Illinois crude has been coming out of strage rather than going into storage.

It is said that no Illinois crude is moving farther south by pipe line than St. Louis, and that circumstance removes the possibility that any Illinois oil is backing up in Mid-Continent storage tanks.

Complete 15-mile extension to New Mexico crude line

The Texas-New Mexico Pipe Line Company has completed a 15½-mile, 4½- and 5½-inch extension line from its Artesia district, New Mexico, carrier to the Maljamar field, oldest oil-producing area in Lea County, and is now laying a short loop to boost the capacity out of the Artesia district from 10,000 to 13,000 barrels daily.

Entry of the company into the Maljamar field, which has been served exclusively by Murchison-Closuit Pipe Line Company since July, 1934, was authorized after Tide Water Associated Oil Company, owner of 10 percent stock interest in The Texas-New Mexico Pipe Line Company, made term contracts to purchase Maljamar crude from independents.

A 7-mile 5½-inch loop, parallel to 5½-inch carrier, is being added by The Texas-New Mexico Pipe Line Company in eastern Eddy County. This extra unit falls between Artesia district station and the western end of an 8-inch section of line built late last year in replacing 22 miles of 5½-inch line.

Oklahoma

Wildcats showing for new pools in Logan and Seminole

Tulsa.—New pools were showing in Logan and Seminole counties and Wilzetta pool of Lincoln County was extended southward.

Helmerich & Payne's McMahon 1, SWc SE 31-17n-1e, 4 miles south of Langston pool, Logan County, connected separator and erected tankage after the wildcat made several heads of oil into pits. Tubing will be run and a production test made. It is estimated at 50 to 60 barrels daily. The test is ½-mile east of Sinclair Prairie Oil Company's School Land 1, an abandoned stripper well at 5260 feet which went on record as the South Langston pool discovery. Pay is upper Simpson and Wilcox sand at 5235-60 feet and 5275-78 feet, perforated with 50 shots and acidized with 1000 gallons. Gas is estimated from 5,000,000 to 15,000,000 cubic feet. Same operators' Kramer 1, NWc SW 24-17n-1e, 2 miles south of Coyle pool, Logan County, cemented 5½-inch pipe at 4889 feet and are bailing fluid prior to perforating Hunton lime at 4748-60 feet where a good show of oil was reported. It failed to make a show in the Wilcox sand, bottomed at 5157 feet.

J. A. Ligon et al, have either extended Wewoka Townsite or opened a new pool 1 mile northwest of production in Seminole County. Patterson 1, SW NW SE 24-8n-7e, pumped 50 barrels of 39-gravity oil in 24 hours. Cromwell sand at 3308-16 feet was given a 3-quart shot before final completion. Culver & Shepherd's Wilmott 5, SE NW SW 3-5n-5e, South Konawa pool, cored a saturated sand zone at 2180-96 feet at the base of the Mayes lime and will perforate casing for a test. Other wells produce from Hunton lime.

Alma Oil Company extended Wilzetta pool, Lincoln County, ½-mile southwest at Sedlacek 1, C N½ NW SW 2-12n-5e. Swabbing 208 barrels in 8 hours, plans called for acidizing with 2500 gallons. Simpson dolomite was topped at 4515 feet and drilled to 4550 feet. Tankage has been installed.

A drill-stem test recovered only mud and water at H. L. Berkey and Carter Oil Company's King 1, SEc SW 2-11n-6e, wildcat which previously indicated a possible producer. Some saturation was cored at 4576-85 feet in the Wilcox sand. Hunton lime, topped at 4280 feet, may be given a test. Test is located 2 miles north of Keokuk pool, Pottawatomie County, which produces from 4 horizons, Calvin, Hunton, Misener and Wilcox.

Byars pool, McClain County, added its sixth and seventh producers. Simpson-Roodhouse Drilling Company's James 2, NW SE SE 9-5n-3e, flowed 275 barrels in 12 hours through ½-inch tubing choke. Patsy Oil Company's Caldwell 2, SW NE NE 16-5n-3e, made 420 barrels natural in 24 hours. Viola lime was marked at 3473-3671 feet.

Stanley Rogers et al's Scott 2, SWc NE 23-6n-8e, a west offset to the operators Booch sand discovery 3 miles southeast of Sasakwa pool, Hughes County, was a failure at 3320 feet. Summit Drilling Company's Cleer 1, C W½ SE SW 6-15n-5e, 6 miles northwest of Davenport field, Lincoln County, showed nothing in Oswego lime, but Prue sand will be tested before abandoning. It has been plugged back to 3510 feet. Continental Oil Company's Schnakenberg 1, NE SE SW 21-21n-4w, cored salty sand in the Wilcox zone at 6515-42 feet, and is shut down for orders.

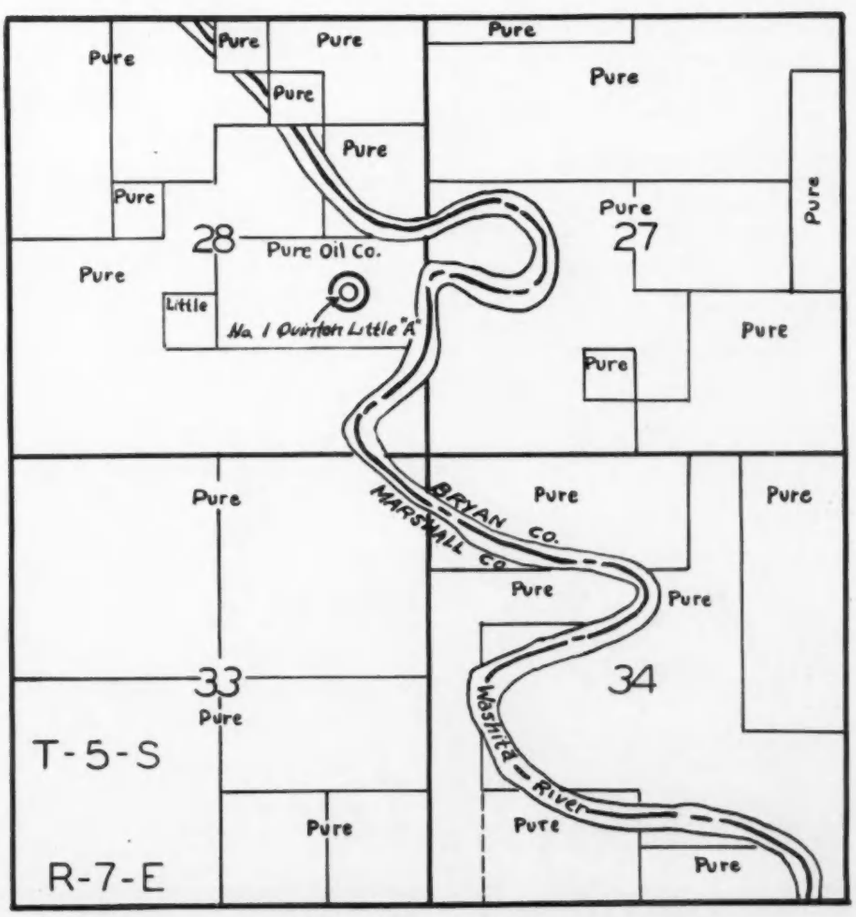
Magnolia Petroleum Company was making repairs at 8012 feet at Fiekes 1, C SW SW 31-18n-14w, a Dewey County wildcat. Sinclair Prairie Oil Company overcame caving hole by cementing and was preparing to drill ahead at German 1, SE NW NW 1-6n-13w, 6 miles southeast of Carnegie, Caddo County. Present depth is 9904 feet.

Marshall County strike cores for test of deeper formations

The Pure Oil Company's Little 1, CW½ NE SE 28-5s-7e, Marshall County wildcat discovery, continued to core saturation in Tulip Creek sand below 5100 feet. First sand was topped at 4850 feet and a drill-stem test in this section showed 70 barrels of crude in 14 minutes. Gravity tested 37 degrees, corrected. A core at 5092-98 feet revealed 5½ feet of stained sand, good odor with some free oil and mud in the core barrel. The wildcat is scheduled to test the Arbuckle lime and determine all possible pay horizons.

The Pure Oil Company has petitioned the Oklahoma Corporation Commission for 20-acre spacing on 36,800 acres surrounding the test. This application is reported to be the largest ever filed and a hearing has been set for March 22. Spacing has been requested in Townships 5, 6 and 7 south and Ranges 6, 7 and 8 east, in Marshall, Bryan and Johnston counties. The company holds 22,000 acres in the block and outside companies hold the remainder as edge acreage.

The strike is in the midst of an area to be inundated by the $54,000,000 Red River dam reservoir, a project that Governor Leon C. Phillips of Oklahoma declared last week he would stop with police power or a court order if the United States Department of War does not withhold construction until a court ruling is obtained on its constitu-



Showing location of wildcat strike in Marshall County, Oklahoma

tionality. Preliminary work has been started across the state line in Texas.

The governor, after conferring with Pure Oil Company officials, declared development may prove the field to be larger than Fitts, in Pontotoc County, which has yielded 85,000,000 barrels of oil and has an estimated remaining reserve of 50,000,000 barrels.

A log on the well gives the following formation tops: Springer 607, Mississippi Caney 2740, Mayes 2940, Woodford 3240, Chert Zone 3345, Hunton 3353, Sylvan 3646, Viola 3925, Bromide Dense 4480, Green Shale 4587, Tulip Creek 4850 feet.

Gas estimated over 5,000,000 cubic feet, bottom-hole pressure of 1300 pounds and shut-in well-head pressure of 2200 pounds per square inch were recorded at the time of the drill-stem test.

Kansas

Barton County 50-barrel lime well opens new pool

Wichita.—Phillips Petroleum Company opened the Wendra pool, Barton County; a new horizon was indicated for the Beaumont field, Greenwood County, and a Sedgwick County wildcat was testing for commercial production.

Five miles southeast of Ainsworth pool, Barton County, Phillips Petroleum Company's Wondra 1, C W½ SW NE 15-17-12w, established a temporary potential of 53 barrels daily. Lansing-Kansas City lime was acidized with 500 gallons at 3049-90 feet. Initially, the well pumped 73 barrels of oil and 33 barrels of water.

K. T. Weideman and Beaumont Oil Company's Hendrickson 1, NWc SE 25-27-8e, in the old Beaumont field, Greenwood County, filled approximately 1000 feet with oil and was swabbing one barrel per hour. This opens a new Arbuckle lime horizon for the area, formerly having only 5 Peru sand producers. Peru production is around 1800 feet, while the new lime pay was reported at 2710-44 feet.

May Open Area

A Sedgwick County wildcat may open a new producing area 3½ miles northeast of Schulte pool and the same distance southwest of Curry pool, G. A. Fuller et al's Stitt 1, SEc NE 21-27-1w, cored 3 good shows of oil in the Kansas City-Lansing lime. These were marked at 2678-80, 2765-70 and 2798-2800 feet. It was bailing one container per hour after drilling plugs.

Northwest of the discovery and only oil producer in the Lyons gas field, Rice County, Mitchell Drilling Company et al's Sangster 1, C E½ SE SW 11-20-8w, set 5-inch pipe at 3185 feet, top of the Simpson, and were bringing in standard tools to test a show of gas and oil at 3185-98 feet.

Lauck and Moncrief were erecting tankage at their wildcat discovery in Ellsworth County. Ehler 1, CWL SW NW 35-16-10w, after acidizing and shooting pay with 17 quarts, swabbed 8 barrels hourly. Ehler 1 is located approximately 1½ miles southeast of Stoltenberg pool and is producing from Arbuckle lime at 3295-3318 feet. West of this pool ¾ mile, Duwe & Farris' Adamek 1, Section 17-16-10w, will test a show of oil in Arbuckle lime at 3370-72 feet.

C. F. Myers et al's Dunn 1, NWc 33-34-5e, 4 miles southwest of Rahn pool, Cowley County, failed to get a show in Bartlesville sand and was drilling in Mississippi lime at 3075 feet.

Lario Oil & Gas Company extended Walters pool, Ellis County, ¼ mile east. Korner 1, Section 11-12-18w, established a potential of 7279 barrels daily after acidizing with 1000 gallons. Hole is bottomed at 3679 feet in Arbuckle lime. J. E. Trigg spudded Rosek 1, C NE NE 13-21-23w, 6 miles southeast of Wakeeney pool, Trego County. Location is on a core-drilled and seismographed high, farmed out from Phillips Petroleum Company. W. M. McKnab is moving in materials for a wildcat test in NE SE SW 4-35-5e, Cowley County, being southeast of Myers test. C. L. Carlock et al's Starkey 1, C S½ SE SE 21-30-7e, has a machine. E. B. Shawver's Davis 1, NE NW NE 21-30-4e, was rigging up rotary.

Two new offsets were staked in the Krier pool, Barton County. Sinclair-Prairie Oil Company staked Hitschman 1, C W½ NW SW 32-16-11w, east offset to the Arbuckle lime discovery well, and Gulf Oil Corporation staked Dolechek 2, C W½ SW SW 29-16-11w, an east offset to the basal sand discovery well. Gulf completed Joseph 1, NWc SW 29-16-11w, for a potential of 1633 barrels daily. Reagan sand was topped at 3307½ feet and drilled to 3315 feet. North of Krier pool, Sinclair Prairie Oil Company was rigging up rotary tools at Schmidt 2, NE SWc NW 20-16-11w. Prusa and Prusa West pools, Barton County, were drawn closer as Gulf Oil Corporation's Redetzke 1, SEc NE 19-16-11w, ¾-mile west of Prusa, swabbed 102 barrels in a 3½-hour test. This extension logged Arbuckle lime at 3333-41 feet.

On the southeast flank of Hugoton gas field, Stevens County, Republic Natural Gas Company's Parker 1, C NE 31-34-36w, was completed for 13,900,000 cubic feet of gas. Total depth is 2820 feet in Winfield lime, topped at 2668 feet.

Order Kansas potential tests

Draw-down potentials have been ordered for all wells in the Beaver (Arbuckle) pool of Barton County, Kansas. Physical tests will be taken on all wells in the Voshell pool, McPherson, beginning March 19.

Tests in both fields will be in accordance with the rules and regulations of the commission which became effective December 1, 1939.

Michigan

Extensions indicated for two scattered oil areas

Mt. Pleasant, Mich. — Extensions loomed last week for one field in Southwestern Michigan and another in the Basin. Lang & Lewis, Inc.'s Nevenzel 1, NW SW 3-3n-14w, Heath Township, Allegan County, over ½ mile due south of developed production in the Overisel field, filled up 870 feet with oil at 1472 feet, 2 feet in the Traverse before a casing string was set. First attempt to acidize took out the packer and operators announced intentions to cement the 5-inch before a second acid attempt.

Wise Field Extended

Richard W. Reading, former mayor of Detroit, appeared to have extended the Wise field, Isabella County, ¼ mile east with his Burwash-Fee 1, NW NE SW 16-16n-3w. Test bottomed Dundee at 3707 feet, 52 feet below top, with 460 feet of oil in 14 hours. First attempt to acidize was scheduled this week. Well swabbed 15, 13 and 17 barrels first 72 hours.

Devries Trustee's Hutchins 1, NW NE SW 4-2n-16w, Ganges Township wildcat, Allegan County, under test for three weeks, after showing 150 feet of oil in the top of the Traverse at 1292 feet was being swabbed after a 500-gallon acid treatment.

Five locations have been staked in the immediate area of Crown Development Company's discovery on the Reimold 1, Section 34-5n-15w, Holland Township, Ottawa County, and at least that many more tentative locations were reported. Twin Drilling Company moved in rotary on a 5-acre lease ¼ mile west of the discovery and, barring trouble, should have Traverse late this week at the shallow depth of 1500 feet. Sohio Corporation was reported to have picked up a number of leases as the most active major. The discovery continued to pump from 160 to 210 barrels a day last week but never has flowed naturally.

Skinner & Shiffmans' Rowe 1, NE SE SE 30-6s-6e, ½ mile east extension shot in Monroe County, topped Trenton at 2054 feet and had a gas and oil show at 2059-76 feet but lacked good oil saturation at 2091 feet.

Sun Oil Company plugged Switzer 1, Section 26-19n-3w, Hamilton Township, Clare County, back from 3897 feet, where it was dry in Dundee lime, to 1275 feet and recovered 206,000 feet of gas in the Stray by perforating casing. The company was reported contemplating an active gas-drilling campaign in the district.

McClanahan & Rowmors' Quist 1, Section 22-21n-7w, Missaukee County, wildcat, was shut down for orders at 560 feet after 10-inch drive pipe collapsed. Virgil R. D. Kirkham's Whaley 1, Section 24-21n-9w, Wexford County, was rigging standard tools after setting 6-inch at 1745 feet.

Illinois

Four basin wildcats promising new pools

Centralia, Ill.—Four wildcat tests in the Illinois basin showed for pool openers last week.

In Jasper County, Pure Oil Company's Warren Consolidated 1, C E½ NE NW 33-6n-10e, 9 miles northeast of the Dundas field of Richland County, flowed 215 barrels natural in 16 hours and was being completed without acidization in McClosky lime at 2847 feet. It is the county's first commercial producer in the state's new development.

In Edwards County, 2 miles south of Albion, Morrison & Noah's Huston Barnes 1, SE NE NE 24-2s-10e, was to cement 5½-inch casing at 3180 feet after 400 feet of fluid rose in the hole during a drill-stem test, opened 4 minutes, at 3128-3217 feet. The top 130 feet was oil and the balance was drilling mud and oil. McClosky saturation was recovered at 3130-36 feet and bottom was at 3240 feet. The test topped the Menard at 2290 feet and Glen Dean at 3097 feet. Casing will be gun-perforated opposite the McClosky showing. Nearest production is 5 miles.

In Hamilton County, Kingwood Oil Company's R. Wilson 1, NW NW SE 6-6s-7e, swabbed 75 barrels of oil in its best 24-hour test from Cypress sand at 2672-95 feet. The well, 5 miles southeast of McLeansboro and the county's second producer, was shut in after 1000 barrels of storage were filled. It will not be completed until a pipe line from a loading rack at Dale can be completed. It topped Glen Dean at 2377 feet, Cypress sand at 2672 feet, Bethel at 2862 feet, Renault at 2904 feet, Aux Vases at 2962 feet, St. Genevieve at 2992 feet, Rosiclaire at 3029 feet, Fredonia at 3081 feet and McClosky at 3120 feet. It was then plugged back to 2733 feet and plug was drilled out after a squeeze job at 2695 feet. An offset, Kingwood Oil Company's Dodd 1, SE SE NW 6-6s-7e, will begin drilling immediately.

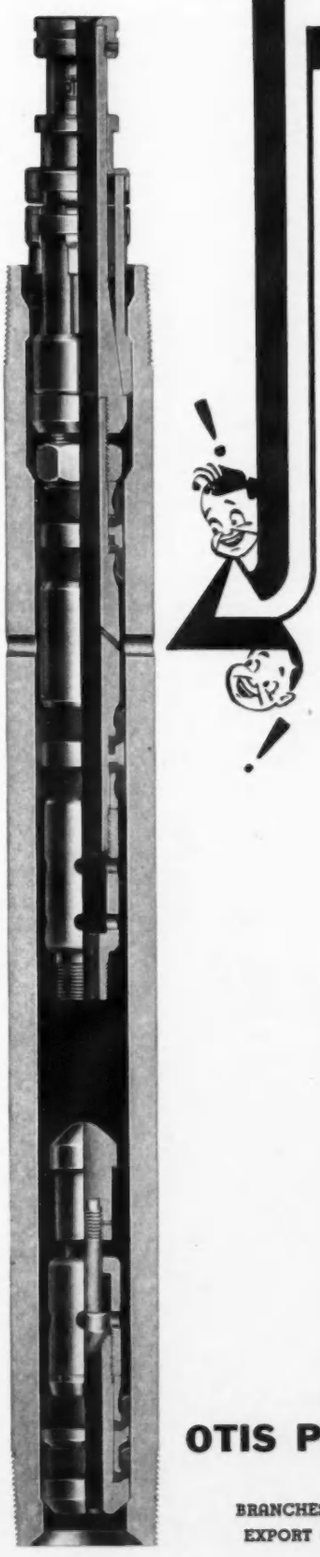
In Wabash County, on the outskirts of Mt. Carmel, Mode-Bruce, Lacey et al's Keneipp Heirs 1, SE SW SE 19-1s-12w, swabbed 148 barrels of oil in 22 hours and has been shut in for storage. The test, another apparent pool opener which may touch off a townsite drilling campaign in Mt. Carmel, is being completed in the Rosiclaire at 2360-66 feet. It is the first test to produce from the formation in Wabash County.

Three other pools have been opened in Illinois this year, one each in Montgomery, Wabash and White counties.

A near-record well featured the week's activity in the Lake Centralia-Salem pool of Marion County. The Texas Company's A. McCollum 24, NW NE 32-2n-2e, flowed 1553 barrels in 3 hours to attain a potential rating of 12,424 barrels a day, from 3410 feet. Devonian pay was at 3363-3403 feet. The well ranks second only to the company's K. Wayman 20 as the state's largest oil well. On a 2½-hour gauge, Wayman well flowed at the rate of more than 13,000 barrels a day.

A south outpost to the field, The Texas Company's Norman Davis 1, NW NE NE 21-1n-2e, was dry through the Salem lime at 2655 feet. The test, ¾-mile south of production, found a show of oil and water in Benoist sand topped at 1915 feet.

The field's north Devonian outpost, King-



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wood Oil Company's Shanafelt 4-C, NW 16-2n-2e, ¾-mile north of deep production, was being swabbed and cleaned out at 3596 feet. The well swabbed some oil.

In the Centralia townsite field there were 83 operations. The 24 completed deep wells in the pool are yielding about 5000 barrels a day, production being taken principally by small refiners and pipe lines. The Sohio Corporation, principal crude purchaser in the Basin, has only five connections to deep wells in the Centralia field. The pool's 550 sand wells, drilled in 1937 and 1938, now have a combined production of 5000 barrels.

Magnolia Petroleum Company spudded a Jefferson County wildcat, Lettie Jones 1, NE 10-3s-2e, McClellan township, which probably will be drilled to the Devonian lime.

Carter Oil Company's Seaman 1, Coles County wildcat, NW NE SW 35-12n-7e, was drilling at 3600 feet, through Devonian lime toward the Trenton.

During February, Illinois' oil production averaged more than 400,000 barrels a day, totaling 11,606,000 for the short month. The previous month's peak in the state's oil history was 10,889,000 barrels during January, 1940. Production for the first two months of 1940, totaling 22,495,000 barrels, equaled 94 percent of the state's entire yield of 1938 and more than one-fifth of the entire 1939 output.

There were 251 producing wells completed during the month, two of them opening new fields to bring the state's total pools discovered since January 1, 1937, to 54.

Indiana

Wildcats drilling over wide area; results meager

Evansville, Ind. — Wildcat activity was scattered over a wide front in Indiana last week, but there were only a few minor completions.

Of particular interest was R. W. O'Mera's Amanda Maier 1, NE SW 21-3s-13w, 2 miles east and south of Griffin field production in Gibson County, drilling at 1500 feet. Delta Drilling Company is contractor.

Four miles east of the new Owensville pool discovery well in Union Township, Gibson County, A. L. Braden's George Simpson 1, SE NE 19-3s-11w, was setting casing on top the St. Genevieve at 2480 feet to test the McClosky. The Aux Vases, topped at 2472 feet, was dry.

In the South Griffin area, Posey County, J. E. Crosbie's Keck 5, SW NE 34-3s-14w, was a 10-barrel completion in Tar Springs.

Testing, with a gauge of 170 barrels in 5 hours from the Aux Vases, was Jack Wraither's Keck 1, NE NW 34-3s-14w.

Extending Midwest Development Company's new field in Columbia Township, Gibson County, to the northeast, Ola B. Brock 1, SW SE 10-2s-9w, shot Oakland City (Cypress) sand with 120 quarts and had 550 feet of oil in the hole.

Frank Damron's Anthony and Mary Humbert 4, Marion Township, Dubois County, SW SW 25-1s-14w, topped McClosky at 638 feet and was abandoned at 700 feet.

On Greathouse Island, at the western edge of Black Township, Posey County, H. K. Riddle and Longhorn Oil Corporation have made location for a McClosky test in the NE NE NE 13-7s-15w. Drilling contract has not been let.

Ohio Oil Company was drilling in the St. Louis at 1375 feet, for Holtzman 1, SE SE 28-4s-4w, Spencer County, southwest of St. Meinrad. It is a devonian test, drilled tight.

Southeast of Griffin, Posey County, a new cement job further delayed completion of Joe Minton and D. M. Hollingsworth's L. P. Hill 1, SE NW 7-4s-13w. Some free oil was reported from the Cypress when plug first was drilled in.

In Wabash County, Illinois, Continental Oil Company has set casing to test Cypress for two new field producers: A. E. Schultz 5, SE NE SE 8-2s-13w, west of Keensburg, and A. F. Cowling 3, NW NE SW 17-2s-13w, a mile southwest of Keensburg.

Kentucky

Henderson County wildcat McClosky test resumes

Owensboro, Ky.—A year-old test in Henderson County inactive since last October, the George Fulton 1, 2½ miles southeast of Reed, has been taken over by Ray M. Cooper and was deepening at 1245 feet for the McClosky. Another Henderson County wildcat, 1½ miles northeast of Zion, Imperial Oil & Gas Products' J. R. Williams 1, was drilling at 60 feet.

In the Utica field, Daviess County, Marhill Oil Company et al abandoned S. A. Burns 1 (Walter Sargent), Section 11-N-28, at 1820 feet, dry through the McClosky.

In the Fordsville district, Ohio County, Henry Scholl's Roy Muffett 4 topped the Barlow at 510 feet and was abandoned at 530 feet.

In the Sunnydale district of Ohio County, H. M. Hunt et al's Charles H. Russell 2, Section 12-M-32, spudded and shut down at 280 feet.

In Livingston County 2½ miles southeast of Smithland, J. H. Dunn et al were drilling below 2480 feet for H. L. Dunn 1. Billy Phillips, Bowling Green, is contractor.

Order 10-acre spacing for Panhandle

The Texas Railroad Commission has entered an order, effective March 13, providing for 10-acre spacing in the Panhandle area. Heretofore, the Panhandle has been governed by the statewide spacing rule but operators, by agreement, drilled on 10-acre spacing.

A hearing was held at Amarillo last week at which the majority of those appearing requested 10-acre spacing. Commissioner Jerry Sadler recessed the hearing to the statewide hearing to be held in Austin March 20. The 10-acre rule was entered to permit continued operations during the interim.

West Texas

Outposts stimulate interest in Stephens County Caddo lime

Abilene, Texas.—The large initial yield of 2 outposts for the Stribling pool, northwestern Stephens County, will have a stimulating influence on development of this Caddo lime area. It was discovered in April, 1938, by A. A. Horwitz and W. P. Oldom, who recently built a pipe line outlet connecting with The Texas Pipe Line Company near Breckenridge.

Half-mile east extension was given the pool when Clyde Greathouse et al's J. J. Robertson 1, NWc S½ of Peter Norton Survey, A-126, gauged 100 barrels oil per hour on 4-hour test after using 5000 gallons of acid in saturated section at 3551-72 feet. Hole filled with oil in 12 hours before acidizing. Top of Caddo lime was logged at 3531 feet, with an elevation of 1181 feet. Stedman Petroleum Company's Powers 1, SWc of G. H. York Survey, advanced production to the north with an initial rating of 756 barrels after acidizing pay at 3545-3627 feet.

W. I. Southern, Inc.'s Carlisle 2, prospective Ordovician producer for the Carlisle pool, Stonewall County, failed to increase its fluid level in deepening to 6605 feet. The hole filled 2100 feet with 41.6-gravity oil after drilling 3 feet of saturation found in top of Ellenberger at 6540 feet with an elevation of 1790 feet. About ¼-bailer water per hour is showing from above the Ellenberger. The well is expected to prove commercial after acidizing. Shell Oil Company's Smith 1, only wildcat in the county, was drilling at 5531 feet, carrying 2000 feet of water from the 5275-99-foot level, being the Strawn series. A string of 5½-inch pipe was set at 5497 feet to reduce water volume, which amounted to 4300 feet before pipe was lowered.

More attention being paid to Lower Permian prospect

Midland.—Tests projected to the Holt pay, lower Permian zone that has injected renewed interest in the central basin area, continue to command the most attention in West Texas. The district is lagging in discoveries this year, and for this reason more attention is centered upon the deeper horizons under known structures. Ector and Andrews counties are the favorite sectors for deep Permian activity.

Landreth Production Corporation's T. P. Land Trust 2-A, fifth consecutive oil strike for the Holt zone on the west flank of the North Cowden field, Ector County, swabbed 66 barrels of fluid, 90 percent being 37-gravity oil, in 12 hours after using 1000 and 2000 gallons of acid in broken saturation at 5165-96 feet. Tubing was lowered to bottom with packer at 5157 feet to exclude open hole below 3972 feet. A pumping unit was to be installed late last week to determine if the oil yield will warrant cementing of a short liner in the hole for completion. This well is 1½ miles southeast of nearest deep production, which extends for a distance of 6¾ miles along a northwest to southeast trend.

M. A. Grisham et al's R. B. Cowden 1, northwestern Ector County wildcat, was drilling at 5290 feet, with an elevation of 3312 feet, and should be the next test to reach the Holt zone. Richmond Drilling Company and Tom Hunter's University-Atlantic 1, situated 4 miles to the north and in Andrews County, has cemented a protection string of 7-inch pipe at 2399 feet to try and recover drill pipe lost at 5172 feet.

The drilling of 25 to 30 wells in the Foster and Johnson areas will be required of Sunray Oil Company in fulfilling development obligations assumed in the purchase of Landreth Production Corporation's entire holdings, including the Johnson pool discovery. The latter received about $200,000 cash and ⅛ over-riding royalty on future production for its 7 pumpers and an aggregate of 720 acres.

Routine development of the Wasson field continues unabated although Shell Pipe Line Corporation has joined Humble Pipe Line Company in restricting crude runs from all properties to 75 percent of the daily allowable authorized by the Texas Railroad Commission. The latter applied pipe line proration, effective February 15, when the field's output was raised above transportation outlet. Aloco Pipe Line Company is restricting its runs, which are largely confined to production held by the Aloco Oil Company, to acceptances of Atlantic Pipe Line Company at Hobbs. The latter has been exceeding its 5000-barrel daily maximum contract on receipts, but this is due to be terminated when crude from the Seminole field begins moving through Magnolia Pipe Line Company's extension line to its Hobbs-Midland unit late this month. Magnolia Pipe Line Company has completed 21 miles of its 26-mile discharge line.

Texas permits

The Texas Railroad Commission last week approved permits for drilling 275 wells in Texas, 69 less than were allowed the week before.

There were 17 new permits granted in the East Texas field, including 10 in Upshur, 4 in Gregg and 3 in Rusk County. From the remainder of the East Central Texas area, 6 locations were reported.

Southwest Texas held first place in the state with 85 permits, including 14 in Webb, 13 in Duval and 11 in Jim Wells County. Gulf Coast operators reported 28 locations.

From West Texas 61 permits were listed, including 27 in Ector and 16 in Yoakum County. West Central Texas operators were allowed to drill 42 more wells, including 14 in Callahan County. The commission approved 30 new locations in the North Texas District, with 14 in Archer County. Operators in the Panhandle area were allowed to drill 6 additional wells.

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North Texas

Wildcat opens new field and makes producing depth record

Wichita Falls, Texas.—A new oil area and a producing depth record for North Texas was recorded in northwestern Montague County March 14 when W. B. Omohundro et al's Wilmer Seay 1, 3½ miles south of Ringgold, fulfilled earlier indications in making a heavy flow of oil and gas on a brief test through casing from Bend lime at 5693-5704 feet. No estimates as to the capacity of the well were made. The flow was diverted via two 4-inch casing outlets to slush pits. The volume of gas and 45-gravity oil satisfied a large gallery of Texas and Oklahoma oil men that it rates among the largest Bend producers in the district.

Approximately $300,000 was spent for leases and royalty protection in the general area during a 10-day interval that elapsed while the well was awaiting completion test through 7-inch pipe, cemented at 5789 feet. The buying flurry started when Seay 1, located 330 feet from west and 1953 feet from north lines H&TC, Section 32, Block 4, flowed steady through drill stem with packer set at 5676 feet. Omohundro, who is a drilling contractor and producer with headquarters at Wichita Falls, joined the buying campaign by taking on a 160-acre tract at $16,000 cash to augment his 1200-acre drilling block. The discovery partially cleaned itself of rotary mud late March 13, but was shut in overnight. The usual practice of washing the hole with water to remove the mud was passed up, as water must be trucked from Ringgold.

The Ringgold pool opener logged top of Bend lime section at 5654 feet, and is the only deep test in the general area. Nearest production lies 3 miles to the southwest on the Worsham ranch, where Walter Gant et al have 7 wells in the 3400- and 3900-foot Strawn with a prorated allowable of 198 barrels daily. A small pipe line extends from the Worsham pool to the Magnolia Pipe Line Company's trunk line.

Sinclair Prairie Oil Company has authorized a third test for the Bonita pool, eastern Montague County Bend lime strike made by the company February 21. Doty 1, a west offset to the producer, landed 10¾-inch surface pipe at 496 feet, and A. P. Howard 2, south offset to the 5249-foot discovery, was rigging up. Sinclair Refining Company began running oil from the discovery March 11 through a 7.3-mile 6-inch extension line from the Nocona area.

Large Nocona Producer

Largest producer in the Nocona deep area was recorded when Stanolind Oil & Gas Company's R. T. McCool 1, NEc of 80-acre lease, gauged 345 barrels of oil natural in 3 hours through ¾-inch tubing choke from conglomerate sand member of the Bend lime section at 5236-55 feet. It is the fourth completion from this lower pay, and affords a minor west extension for the pool. Top of Bend lime was called at 5176 feet. Rogers & Rogers' Astley-Texaco 3, southwest offset to the Bend pay discovery, flowed 77, 60 and 54 barrels natural through ¾-inch choke on official 3-hour potential gauge from Bend pay at 5250-59 feet, with the hole bottomed at 5266 feet. Slight dip in the structural position of the Bend was recorded by Sunray Oil Company and Ramsey Petroleum Corporation's Burnett 2, 715 feet southwest of the most southerly 5200-foot producer, in logging conglomerate sand at 5225-30 feet and lime at 5295-5310 feet. Formation tester used at 5188-5325 feet yielded oil cut mud and a greater volume of salt water. Casing is to be run to try for an oil completion.

Walter Gant and Continental Oil Company's Brown 1, western Montague County wildcat and 5½ miles northeast of Bowie, was to gun-perforate casing near the 5300-foot level and used acid in the Strawn. It has been plugging back from Ellenberger at 7288-7341 feet by stages for tests through casing perforations with negative results. The Bend lime, topped at 6112 feet, gave promise of production based upon samples and electrical formation survey.

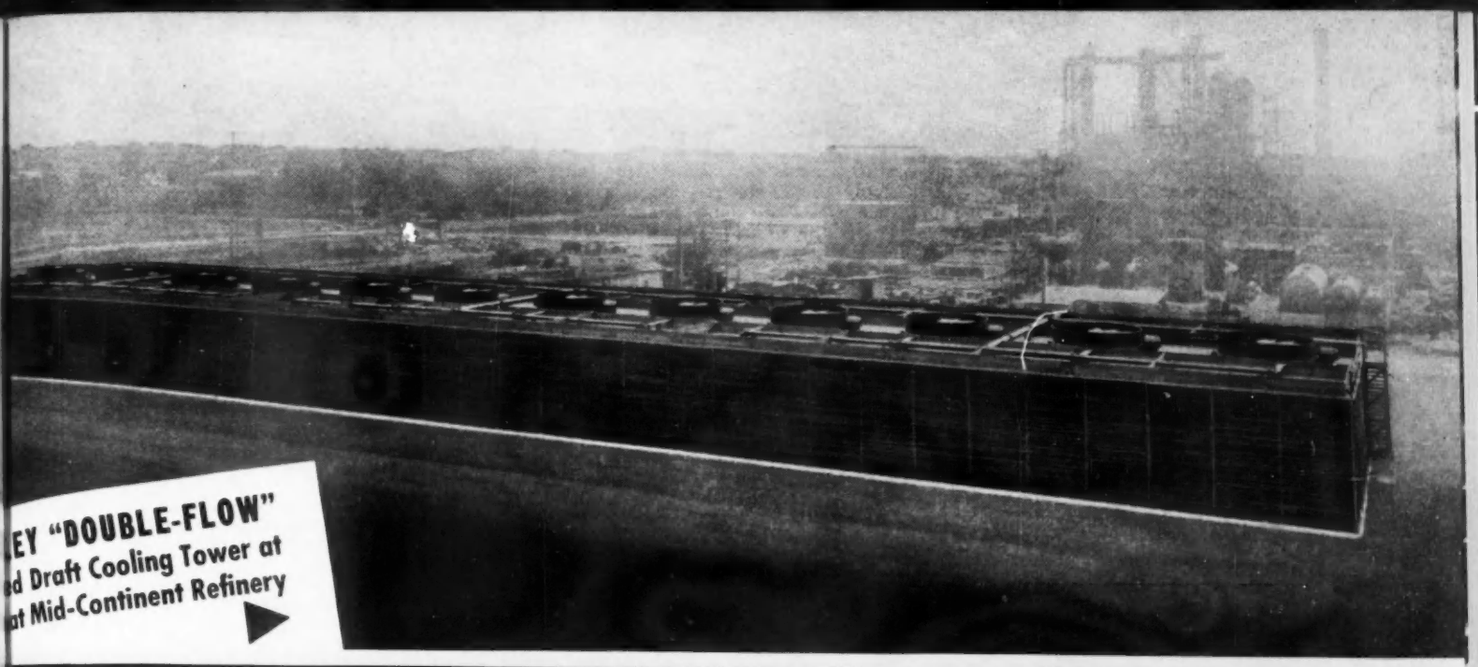
British-American Oil Producing Company's Wilson 1-C, south of the company's Bend lime discovery for the Mankins area, northwestern Archer County, encountered sufficient oil saturation in the upper Ellenberger, topped at 5233 feet, to warrant landing of 7-inch pipe at 5218 feet for a production test. Hole is bottomed at 5425 feet. Formation tester used in the regular Bend pay at 4832-88 feet, and later in the Ordovician member at 5230-65 feet, proved dry. Roeser & Pendleton, Inc.'s Parkey 1, an outpost, was coring at 4750 feet. Hedrick Oil Company et al's Wilson-McCrory 1, which is testing a separate structure 2½ miles south by east of the Mankins pool, was drilling at 3690 feet.

West extension for the K-M-A deep lime area was in prospect for S. H. Fagadau et al's A. D. Potts 1, near NEc SE H&TC Section 4, Block 7, which logged oil sand at 3989-4000 feet. Pipe was cemented at 3982 feet for completion. It is a mile west by south of nearest Strawn production, and occupies a favorable structural position in reaching the lime marker at 3886 feet.

Bend Fails at Hull-Silk

The Bend lime was eliminated as a prospective oil horizon for Continental Oil Company's Wilson-McCrory 1-A-20, NE SW H&TC Section 20, a mile east of the northeast portion of the Hull-Silk field, when 6000-gallon acid treatment of broken saturation at 5140-5250 feet failed to yield oil or gas. Hole is to be plugged back to test broken oil saturation in lower Strawn at 4698-4705 feet after gun-perforating 7-inch pipe, cemented at 5138 feet. Top of Bend marker was called at 5144 feet.

A failure for the Shell-Henderson pool, southwestern Clay County strike made early this year, was recorded by L. T. Burns et al's Mullens 1, SEc N½ Section 2617, in drilling to 3655 feet. Situated ¾ mile northwest of the wildcat pumper, the dry hole provided a surprise as Shell Oil Company's well logged 3 oil



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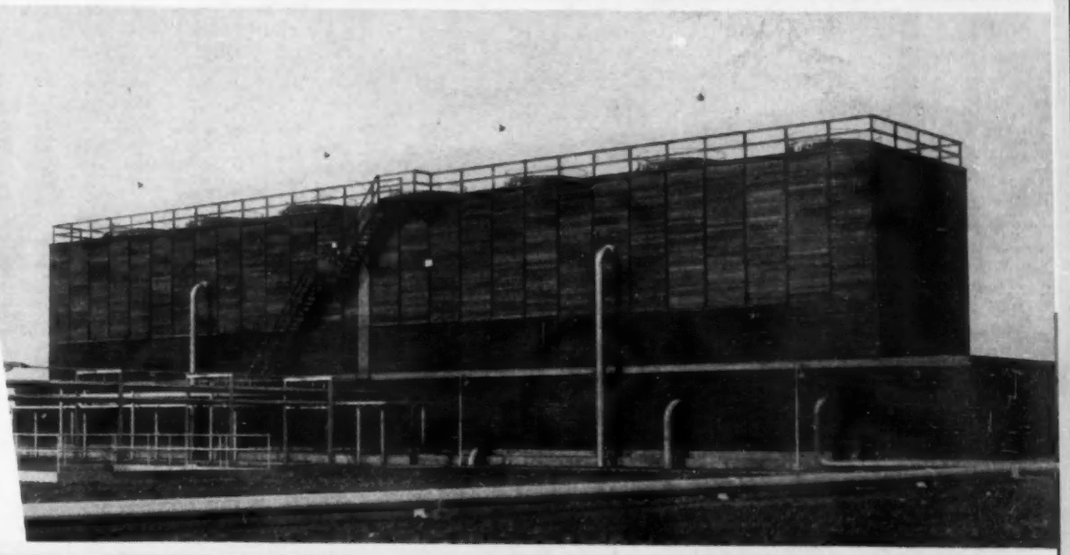

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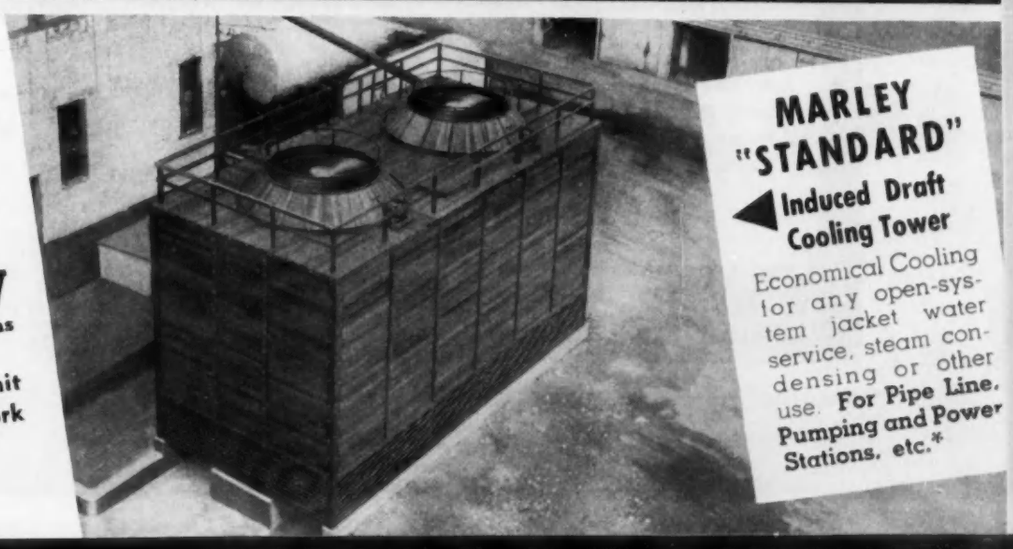

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zones in the Strawn section, and completed in the middle pay, topped at 3505 feet. Independents made large expenditures for lease and royalty protection within and adjacent to the discovery block. Shell Oil Company has started operations on Henderson 2, a southeast offset to its discovery.

Numerous oil discoveries during the past 2 years from the Strawn and Bend horizons in North Texas counties that border on the Red River, and also Archer and Jack counties, have resulted in heavy investments for lease and royalty protection. Independents have been the most aggressive, while major-company participation has been restricted to a minority group insofar as paying large cash bonuses. The Hull-Silk and Walnut Bend fields have been the most consistent among the comparatively new discoveries in yielding profitable wells without an abnormal quota of failures. The majority of the more recent deep lime discoveries, based upon development to date, will be comparatively small in area, thereby restricting the participation of those that invested in leases and royalty interests.

A second test for the unitized discovery block proved for Bend production in the Jolly area, west central Clay County, has been started by Continental Oil Company, Superior Oil Company and A. R. Dillard. Their J. D. Avis 1, SEc of Rains County School Lands Survey, is a west offset to the producer, which flowed 142 barrels 40.7-gravity oil on 3-hour gauge through ¾-inch choke after acidizing broken pay at 5358-5400 feet. The latter established a new depth record for the district last November. O. O. Ross 1, NEc Section 8 and a southwest diagonal offset to the producer, has also been authorized for drilling.

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East Texas

Completion of Camp County discovery (?) delayed by titles

Tyler.—A wildcat and semi-wildcat awaiting production test through casing from the Lower Trinity horizon in the East Texas Woodbine belt can have considerable bearing on future drilling in their respective areas.

The Camp County prospect of Harry Moss and William McGlothlin et al on the Joe Venters tract, S. Wright Survey, 2½ miles southeast of Leesburg, cemented 5½-inch pipe on bottom at 8087 feet after logging adequate oil saturation in the basal Trinity to indicate production. Electrical formation survey placed the favorable porosity in sand at 7947-75 feet and 8001-38 feet with an elevation of 385 feet. Lease title work may cause the owner to defer making a production test through casing perforations for several weeks. In the meantime lease buying has moved into adjoining counties to the east, west and south. Regardless of the final outcome of Venters 1, additional tests will be drilled in the general area.

Sun Oil Company's Huddle 1, 2 miles south of the discovery gas-distillate producer on the Chapel Hill pool, Smith County, was due to drill plugs from 5½-inch pipe at 7870 feet late last week preparatory to testing, with the hole bottomed at 8226 feet. Top of Pettit was placed at 7930 feet and first Travis Peak at 8090 feet by electrical log reading. This outpost failed to respond favorably to drill-stem tests made at intervals in the Lower Trinity but formation samples reveal ample saturation to make a producer.

Shell Oil Company's Campbell 1, oil discovery on the north end of the same structure, has been allotted a special allowable of 250 barrels daily for a 30-day test run, having originally received a quota of 100 barrels daily.

Production test for Shell Oil Company's Dorsey 1, northeastern Houston County record depth well, was delayed by a fishing job that resulted while attempting drill-stem test opposite perforations in 5½-inch liner at 10,794-10,822 feet. The liner was cemented at 10,898 feet in Pettit, topped at 10,658 feet.

East Texas bottom-hole pressure up slightly

An increase of 1.69 pounds in the bottom-hole pressure for the East Texas field during the month ending March 8 was reported by the Texas Railroad Commission last week. This resulted in an average pressure of 1065.51 pounds for the field.

Bowles hearing postponed

A hearing on an increased allowable for the Bowles pool, Taylor County, has been postponed indefinitely by the Texas Railroad Commission.

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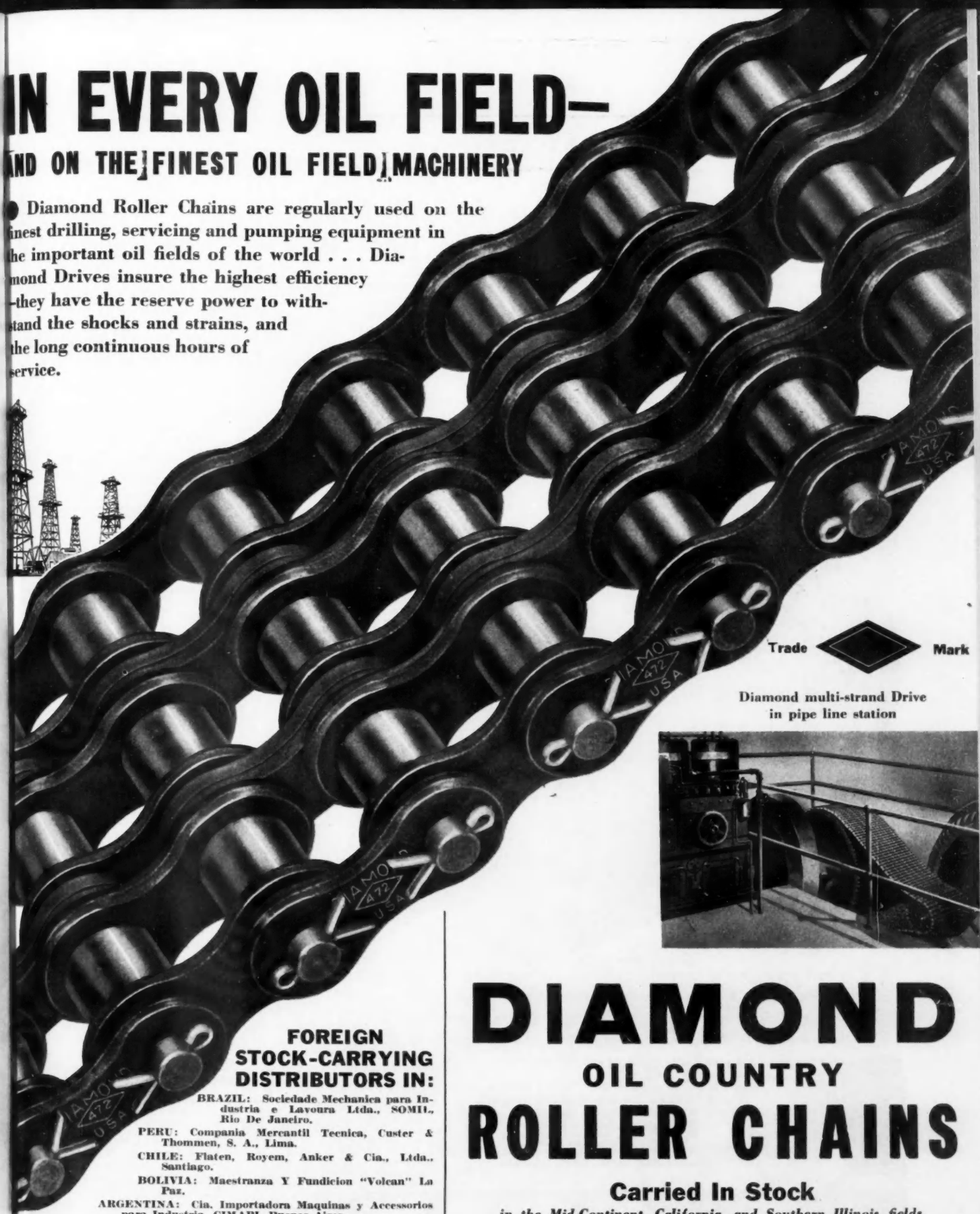

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Southwest Texas

Wade City production widened north and south

Corpus Christi.—Wade City, expanding as one of the hot spots of the South Texas Gulf Coast, added its second and third producers in the new 4900-foot Vicksburg crude sand. The wells extended the pool to the north and south.

Henshaw Brothers encountered the top sand at 4782-4813 feet and the lower pay at 4935-46 feet in McNeill 1, several locations north of production and pipe was set through the 4900-foot zone. The sand was encountered about 15 feet lower than in the discovery, indicating a dipping to the north.

Rated at 450 barrels per day through 3/16-inch choke, Rodney Delange's McNeill 3, southeast offset to the discovery oil well, has been completed in the 4900-foot pay. It found the top sand at 4802-30 feet, the lower at 4927-45 feet and was completed through perforations at 4931-39 feet. Pressures were 550 pounds on tubing and 750 pounds on casing.

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Completion of a second and third well in the 3000-foot pay in the Victoria field, Victoria County, improved the outlook of that district. The pool started out as an apparently spectacular development, due to the shallow sand at 2500 feet. High gas/oil ratio, however, hampered work and interest died until the recent discovery of the added zone. W. V. Hardin, who opened the sand, cored the pay in his second well at 3036-41 feet. Buckert 1 flowed 345 barrels of oil per day through ¼-inch choke under 700 pounds tubing and 900 pounds casing pressures.

Luling Oil & Gas Company's Miller, in the same field, found the sand at 3040-53 feet, broken by a 5-foot section of shale, then more sand at 3058-66 feet. It was completing.

Kirby Sharp and Fred Wood failed to open a new pool 1½ miles north of Odem with C. E. Hart 1, Burgess Survey, San Patricio County. Hole had been plugged back from 7411 feet, perforated at 6907-11 feet and swabbed salt water and oil.

North of the Stratton field in Nueces County, Gulf Plains Corporation was expected to materially extend the 6600-foot condensate production. O. A. Gruene 1, SW SE Section 6, was coring for that pay as the week closed. The well is one of a group of 10 to be sunk to provide gas and distillate for a recycling plant, already under construction.

New production in prospect west of Kelsey pool

Mission.—Establishment of new production 6200 feet west of the Kelsey pool in Starr County appeared brighter late in the week with Royal Oil & Gas Company's E. Juarez 1, Teresa grant, testing the Kelsey sand. It had perforated at 4510-15 feet, showing salt water under 300 pounds pressure in 21 minutes. Perforations were squeezed and new perforations were being made in sand at 4671-89 feet. It is expected to make a gas well. The test had been carried to 5638 feet, but was plugged back.

Sun Oil Company had reamed down to 6606 feet and was going ahead in E. Rodriguez 1, Teresa grant, several miles farther southwest.

Davis & Company, developing the Rincon field, is establishing more sands in this Starr County area. Four wells were in final stages of completion in the 4200-foot zone at the close of the week, one picking up a new lens about 40 feet below the main sand. This company is runnnig four rigs regularly in the Frio-Vicksburg area.

Calliham extension

Three Rivers.—A new shallow area or a 2-mile northeast extension to the Calliham field was in prospect as Hagan & Stewart Drilling Company was bailing oil from S. E. Reagan 2, Michael Hely Survey. The test is in the Calliham sand at 776-84 feet, and is 900 feet west of Reagan 1, which showed water in the same pay. Both wells are in Live Oak County.

H. F. Baker had a threatened gas blowout at 341 feet in C. D. Saunders 1, Hays Survey, 2½ miles west of Whitsett. It was killed and the hole cemented.

New operations starting with Wilcox as objective

San Antonio.—Continued disappointments have materially dampened the Wilcox play in South Texas. Despite these failures, new operations are being started in an effort to further explore these lower regions.

While no information is being released, it is currently reported that casing will be set for a production test of the Wilcox in Atlantic Refining Company's Conwell 1, Myersville or Thomaston prospect in southern DeWitt County. The well topped the Wilcox zone at 7832 feet, drilled to 8519 feet and found a series of thin sands with oil odors. An electric log is said to have given some promise of production.

In Bee County, Anderson-Prichard Oil Corporation and Mills Bennett Production Company were drilling near 9000 feet in D. E. Robinson 2, at West Tuleta. Drill-stem test at 8112-22 feet in Wilcox tested water. Should the hole fail to find anything below, it likely will be given a test in sand at 7515-35 feet. In the Pettus field, Union Producing Company's Ray 56, was below 7765 feet. Bunte Brothers, Inc., and Jack Frazier's Earnest 2, on the Yougeen prospect, southwestern corner of the county, was drilling 150 feet short of its 9500-foot contract.

Edwin M. Jones had reached 7700 feet in George West 1, a deep test northwest of George West in Live Oak County.

O. W. Killam has taken a block of 34,000 acres from the L. R. Ortez family and is planning a deep operation six miles northeast of Laredo, Webb County. In the northeastern portion of this county, Sinclair Prairie Oil Company's Callaghan 1 is drilling below 5500 feet on a deep contract.

Shell Oil Company is preparing to drill, probably to 10,000 feet, in southwestern Colorado County, three miles southeast of Sheridan.

Deep contract in LaSalle County first of three tests

San Antonio.—The deepest drilling contract ever awarded in South Texas went to Al A. Buchanan Drilling Company of San Antonio for a 12,000-foot operation to be sunk in northeastern LaSalle County. The well is to be J. L. Washburn 1, in the L. W. Earnest Survey No. 88, eight miles southwest of Fowlerton. It is one of three contemplated by H. R. Cullen et al (Eltobilt Oil Company) in this region. The group has in excess of 100,000 acres under lease for the exploration.

Making another test of Anchorage serpentine prospect

San Antonio.—Having drilled to 3256 feet, Red Bank Oil Company et al's Pratt 1, on the Anchorage serpentine prospect in Atascosa County, was preparing to make another production test. It is at about the top of the Austin chalk, having gone through a thick section of serpentine with an oil showing.

The above well, one of nearly a dozen drilled on the structure, gives promise of making some sort of a producer.

Fred Nute's Howell 1, 2½ miles southwest of the Nash Creek field and on the same faulting in Guadalupe County, has been abandoned at 2894 feet, having topped the Austin chalk at 2473 feet. It is believed to have drilled into the fault and down its hade, chalk fragments having been encountered much higher in the hole. Another test is contemplated.

Sejita extension well has condensate from five sands

Laredo.—Perforating in a sand series between 5476-5675 feet with 194 shots, Standard Oil Company of Texas has completed a condensate well to widen the Sejita field of Duval County approximately ¾ mile to the northwest. Rodriguez 1 had been carried to 6838 feet in the Yegua series, showing gas and distillate at the bottom of the hole. It was plugged back and finished in Hockleyensis.

The completion was of interest in that the well was finished in a sand series covering 199 feet of hole. In Jack Casey 1, the discovery, these sands were tested individually, each making distillate. Five separate zones are involved in the completion.

FRANK OLIVER FREESE, 68, retired secretary of Humble Oil & Refining Company, died March 11 at his home in Houston.

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Texas Gulf Coast

Liberty County wildcat testing four possible producing sands

Houston.—A new oil field may be opened in the Double Gum Bayou area, Liberty County, if Titantic Oil Company, Sidney Smith and Hilary Hebert's Boyt 1, H. & T. C. Survey, Section 9, is productive from sands already cored. The side-tracked hole is bottomed at 8700 feet with 7-inch casing set. An electric log was run and it showed possible sands at 8360-8420 feet, 8509-15 feet, 8566-83 feet and at 8597-8606 feet. Side wall cores showed oil sands, gas odors, and odors and cuts of oil. They were taken at 8509 feet, 8511 feet, 8572 feet, 8576 feet, 8578 feet, 8582 feet, 8598 feet, 8602 feet and 8606 feet. Boyt 1 was originally drilled to 8834 feet and blew out, showing gas and oil. Drill pipe was stuck and operators were forced to plug back and side track.

Two gas sands were discovered at Caplen field, Galveston County, when Sun Oil Company tested wells on the south flank of the field and on the east side. State 1-26, south of production, was drilled to 7660 feet and 7-inch casing set at 6186 feet. It was perforated with 20 shots at 5975-85 feet and came in flowing 1,055,000 cubic feet of gas daily through 9/64-inch choke with tubing pressure of 2350 pounds. On the east side, Zinn & Forman 3 was perforated with 46 shots at 7526-46 feet and made 5½ barrels of distillate and 22 barrels of salt water in 12 hours through 3/16-inch choke. Tubing pressure was 2800 pounds. The well has been killed to be reworked.

Anahuac field, Chambers County, was extended ½ mile east by Humble Oil & Refining Company's Garth B-1. The well was perforated with 23 shots at 7135-43 feet and flowed 463 barrels of 30.2-gravity pipe line oil daily through ¼-inch choke with tubing pressure of 650 pounds and casing pressure of 200 pounds. A drill-stem test at 7147-60 feet showed oil and salt water.

Three miles north of Cedar Point, Chamber County, Geo. Anderson abandoned Lawrence 1, W. D. Smith Survey, after making a series of tests. Hole was drilled to 7215 feet. Tests around 7126 feet showed salt water, hole was plugged back and when casing was perforated with 48 shots at 4265-85 feet; salt water was swabbed.

Anchor Extended

Glenn H. McCarthy has extended Anchor field, Brazoria County, southeast with Galaznik 1, J. De J Valderas Survey. The outpost was perforated with 9 shots at 10,480-483 feet and with 24 shots at 10,480-485 feet. It flowed an estimated 24 barrels of oil per hour through ¼-inch choke with tubing pressure of 2500 pounds and casing sealed. It first made 52-gravity oil, and in 14 hours gravity decreased to 34.8.

About 2200 feet northwest of the discovery, Glenn H. McCarthy was still testing Salmon et al 1, Geo. Robinson Survey. Perforated at 9820-24 feet, the test made 130 barrels of 52.4-gravity oil daily through 2 ¼-inch chokes. Tubing pressure was 2200 pounds. Two miles southwest of the discovery, Glenn H. McCarthy's Neidringhaus 1, J. Bradley Survey, was fishing at 9996 feet in shale.

Humble Oil & Refining Company's Bassett Blakely 1, outpost for Danbury field, Brazoria County, was shut down after making a series of tests in new sands. The last test was at 5153-66 feet and it showed salt water. A trace of oil was shown on a drill-stem test at 5410-5413 feet, but salt water was shown also. At 6028-32 feet, 1140 feet of salt water was recovered.

Another wildcat failure was reported for the Pearland prospect, Brazoria County. McDannald Oil Company's Hatfield 1 was dry at 7700 feet in the Vicksburg formation. No oil shows were reported. Salt water sands were cored at 7080 feet and at 7424-40 feet.

Northwest of the discovery at Rosenberg, Fort Bend County, Humble Oil & Refining Company shut down Miller 1 after making a number of tests. Casing was perforated at 8252-68 feet, and on swabbing the well failed to flow. A test at 8530 feet showed gas and distillate.

Allen Dome Wildcat Dry

Titantic Oil Company has abandoned another wildcat on the flank of Allen dome, Brazoria County. Poole 1, T. W. Alley Survey, was dry at 4400 feet in shale. It ran an electric log. Salt water sands were cored at 4385-95 feet.

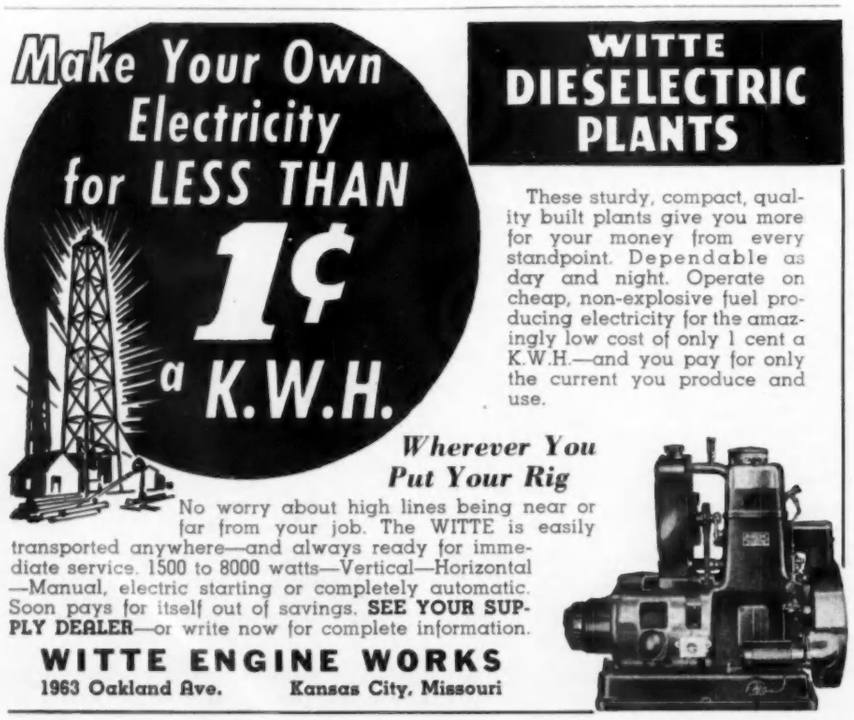
On the east side of Humble field, Harris County, Carlton et al have located a deep test, Bender Estate 1, 2066 feet south from the northeast corner of survey thence 466 feet west at right angles in the J. W. Singleton Survey. In the Cedar Bayou area, Chambers County, Rowan & Nichols have located Lobit 1, 489 feet from the north and south lines of Block 8 in the B. Barrow Survey.

Mackhank Oil Company's Wisian 1, west of the discovery at Hilje, E. T. R. R. Survey, Section 101, Wharton County, was waiting on cement for a production test. Hole is bottomed at 5232 feet. Sand with an odor of oil was cored at 5191-5212 feet, and on drill-stem test through ¼-inch chokes the well showed a 200-pound pressure and operators recovered two gallons of distillate after the testing tool slipped. Cores were taken at 5212-25 feet and broken oil and gas sands were cored. The same was at 5225-5232 feet. Casing was set at 5225 feet. The Texas Company's discovery well was completed at 5220-30 feet.

Gulf Oil Corporation's Bordages 3, 640 feet southwest of Bordages 2, which discovered a new deep sand on the northwest side of Fannett field, Liberty County, was drilling below 8130 feet in shale after logging a sand with a gas show at 8117-25 feet. Bordages 2 was completed below 8200 feet.

Titantic Oil Company's Broussard Hebert 2, south of production at South China area, Jefferson County, was cleaning into burning pits through 5/32-inch choke. Tubing pressure was 300 pounds and casing pressure was 500 pounds. After setting 5½-inch casing at 7882 feet, it was perforated with 40 shots at 7870-79 feet. Oil sands were cored at 7869-80 feet. Northeast of the operator's Guiterman 1-B, Guiterman 2-B was being reworked. Perforated at 7535-39 feet with 24 shots, it swabbed 40 percent oil and 60 percent salt water. Perforations have been squeezed.

In the Buckeye area, Matagorda County, Barnsdall Oil Company located Stoddard Estate 1, 2500 feet from the southwest corner of the J. B. Wilson Estate tract, G. B. M. Cotton Survey. It is about 1700 feet west of the United North & South Development Company's gas and distillate well drilled some time ago. The test is projected to 10,000 feet or deeper.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Louisiana Gulf Coast

St. Mary Parish wildcat to test sand saturation

Lake Charles. — On Bayou Pegion prospect, Iberia Parish, Plymouth Oil Company's McHugh Heirs 1, Section 13-12s-10e, looked disappointing when the first test was made on the wildcat. Casing was perforated with 98 shots at 8110-50 feet and a drill-stem test showed 5000 feet of salt water. Operators will plug back and test a sand around 8050 feet which showed oil on a drill-stem test. There are two other horizons to be tested which also showed oil on drill-stem tests.

On West Cote Blanche prospect, St. Mary Parish, The Texas Company was preparing to test State 1, 16s-7e, after drilling to 8685 feet; 9⅝-inch casing has been set on bottom with cement retainer at 3172 feet. Oil sands at 3109-3137 feet and at 3141-60 feet will be perforated. These sands showed 35 percent porosity and from 16 to 20 percent saturation.

On Delta Farms prospect in Lafourche Parish, Tide Water Associated Oil Company made a drill-stem test on Delta Farms 1 and recovered oil. It is the first oil show in the wildcat since beginning a series of drill-stem tests several weeks ago. Casing was perforated with 40 shots at 11,310,318 feet and the well started flowing in 25 minutes. It flowed 33 barrels of 30-gravity oil in one hour through ¼-inch choke. Pressure was 1200 pounds. After drill stem was pulled, it had 150 feet of salt water on bottom. Lower section of the sand was squeezed to shut off water, and cement plugs were being drilled for another test.

Continental Oil Company set 7-inch casing at 10,955 feet in Niblett Farms 1, Niblett Farms area, Jefferson Davis Parish, after it attempted to blow out at 11,619 feet. The wildcat showed gas and distillate and special heavy drilling mud was pumped into the hole to keep it under control. Top of the sand was at 11,612 feet.

Atlantic Refining Company's Whitmer 1, Neale area, Section 26-3s-11w, Beauregard Parish, was coring in shale at 8450 feet, reported to have logged sand with a show of oil at 8366-78 feet. It had salt water sands in the Cockfield formation. Same operator's Lutcher Moore 1, at 10,500 feet, had salt water sands in the Wilcox formation.

Superior Oil Company's second well on the southwest side of Bayou Blue field, Iberville Parish, logged three new oil sands before going into salt at 7006 feet. Schwing Lumber Company 2, 990 feet west of Schwing Lumber Company 1, Section 74-9s-10e, cored oil sands at 1969-80 feet at 4965-81 feet and at 6934-80 feet. The deeper sand will be tested first. The discovery on the southwest flank was completed around 5000 feet.

The Texas Company was preparing to test a new oil sand at Golden Meadows, Lafourche Parish, in La Terre 3. If productive, it will be the deepest producing sand for the field. Hole is bottomed at 10,472 feet with 7-inch casing set. Casing was perforated with 47 shots at 10,365-388 feet.

Two wells at Barataria, Jefferson Parish, have evidently missed the 8200-foot producing horizon. The California Company's Zerinque - Community 1, northwest of the discovery, Section 2-16s-23e, was shut down at 8275 feet after logging salt water sands at 8215-8255 feet and at 8260-65 feet. Carter, Perrin & Brian's Rutley-Wiseman 1 was drilling in shale below 8310 feet. It is reported that salt water sands were cored at 8181-93 feet and shale logged at 8197-8232 feet.

W. T. Burton announced location for another deep test on the east flank of Starks field, Calcasieu Parish. Industrial Lumber Company 2 is 825 feet west of Industrial Lumber Company 1, which was abandoned below 7400 feet. The first test indicated at one time that it may open a new producing sand for the area.

William Helis's Rycade Oil Company 1, on the flank of Section 28 salt dome, St. Martin Parish, was abandoned at 9411 feet in shale with stuck drill pipe. The wildcat failed to log salt.

Gulf Oil Corporation abandoned Buras Levee District 1-D, Section 6-23s-31e, West Bay area, Plaquemines Parish, after logging high-pressure salt-water sand around 10,000 feet. Location has been made for Buras Levee District 1-E in Section 1-23s-30e.

On the south side of Port Barre field, St. Landry Parish, The Texas Company was coring deeper in Botney Bay 27 after logging a new oil sand for the field. Hole is bottomed at 6513 feet in broken sand with an oil odor. Cores at 6262-72 feet, at 6336-46 feet, at 6420-6436 feet and at 6508-13 feet showed broken sand and shale with oil odors. Casing has been set at 6239 feet.

Iberia Petroleum Company has completed Moresie 1-A at Anse La Butte, St. Martin Parish, at 2479 feet. It flowed 11 barrels of 26-gravity oil per hour through 12/64-inch choke with tubing pressure of 850 pounds and casing pressure of 480 pounds.

At West Lake Verrett, St. Martin Parish, Shell Oil Company is installing a blowout preventer on Jeanerette Lumber Company 4 after logging additional new sands. Hole is bottomed at 11,890 feet. Sand with a gas show was cored at 11,864-887 feet. Other shows of oil and gas have ben cored up the hole.

East of production at Woodlawn, Jefferson Davis Parish, Union Sulphur Company is testing Trimble 1 after casing was perforated at 9493-97 feet. It flowed 70 barrels of 48-gravity oil daily through ¼-inch choke.

East 1¼ miles of The Texas Company's Vermilion Parish School Board 1, Erath prospect wildcat, Vermilion Parish, G. H. Vaughn announced location for Avery Boullion 1 in center of a 20-acre tract in Section 49-3s-4e.

Glassell & Glassell's Trushell 8, flank test at Jennings field, Acadia Parish, was abandoned after a series of tests showed salt water. Drilled to 10,735 feet, it is the deepest test ever drilled at Jennings.

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North Louisiana

LaSalle Parish wildcat has only trace of oil with salt water

Shreveport.—H. L. Hunt's Louisiana Central Lumber Company 9, NE NE 13-10n-2e, LaSalle Parish wildcat, 5 miles east of the shallow Urania field, proved disappointing when tested last week, showing only a small amount of gas, a trace of oil and much salt water when tested. It had logged 19 feet of soft gray porous sand showing gas from 2885 to 2904 feet, the last 2 feet carrying salt water. Separator may be installed and sufficient gas may be produced to use for fuel at Hunt's and Arkansas Fuel Oil Company's Goodpine 1, NW NW 18-10n-3e, ½-mile to the east which is drilling below 8925 feet.

P. C. Alexander's Tilley 1, SW NE SE 30-8n-12w, Sabine Parish, ½-mile northeast of Shallow Zwolle field production, was completed flowing 170 barrels of oil daily through open tubing. It is producing from the Zwolle chalk. Standard Pipe Line Company has laid connections to the well. Alexander has staked locations for direct north and west offsets to the new producer.

Continental Oil Company, which is drilling a series of wildcat tests on geophysical prospects in northeast Louisiana, made location for another of the series last week, Tensas Delta 1, SW SW 12-9n-7e, Catahoula Parish.

Fifteen completions were recorded in North Louisiana during the week of which 10 were oil wells, three were small gas wells, and 2 were failures.

Gulf Refining Company's Madison Parish wildcat test, Sondheimer 1, SE NW 33-18n-12e, set 9⅝-inch casing at 2700 feet; total depth is 2884 feet. It is a 6000-foot geophysical prospect.

Superior Oil Company is installing a pumping unit at Pickering Lumber Company 1, W. J. Crane Survey, Shelby County, Texas, wildcat 6 miles east of Shelbyville, which showed oil and some water when production test was made at 2626 feet.

Arkansas

Miller County test has shows of oil in two formations

El Dorado.—Having shown some producing possibilities in both the Blossom (Ozan) and Paluxy horizons, Standard Oil Company of Louisiana's Sturgis 1, NW SE 1-17-27, Miller County geophysical wildcat prospect, drilled Thursday at 3680 feet in shale; elevation is 346 feet.

After logging 7 feet of oil sand and shale at 2923-31 feet in the Blossom, this test showed 2 stands and 1 joint of fluid in a 30-minute drill-stem test with ⅜-inch chokes at top and bottom. The first stand showed only mud, the second oil with mud and the bottom joint oil cut with mud. There was no trace of salt water.

Drilling and coring ahead, the well later showed 2700 feet of 32.8 gravity oil in a 25-minute drill-stem test in the Paluxy from 3584-3600 feet. Three-eights-inch chokes were again used at top and bottom.

In a 10-foot core from 3600 feet the test logged 5 feet additional saturation and base of Paluxy was placed at 3606 feet. A core from 3610 to 3620 feet showed red shale and another core from 3673 to 3680 feet showed shale with streaks of sand carrying some oil saturation. This is a projected deep Smackover-lime test.

J. K. Mahoney's Emma Riley 2, C NE NE 14-18-19, east offset to a recently completed 1-mile east extension of the Atlanta field, Columbia County, was completed in the Smackover lime at 8220 feet, flowing 285 barrels of oil daily through 12/64-inch choke. Three new locations were made in that end of the field as a consequence of the completion.

Fohs Oil Company is drilling below 1000 feet on a 4500-foot wildcat prospect in Arkansas County, 12 miles west of Dewitt. Miller 1, Section 33-5s-4w and is on a block assembled by C. W. Robinson of Shreveport. Loffland Brothers also have an interest in the block.

Arkansas permits

Four drilling permits were authorized last week by the Arkansas Oil and Gas Commission, as follows: Calhoun County—British American Oil Producing Company, Freeman Smith Lumber Co. 1, C SE NE 17-15-13; Columbia County—Shell Oil Company, Peoples Bank of Columbia 2, located 90 feet N of C SW SW 24-17-20; G. H. Vaughan, J. K. Mahoney, Trustee 1, C NW NW 13-18-19; Hassie Hunt, C. F. Hendricks 1, C SW SW 12-18-19.

Mississippi

Yazoo City has another edge failure; three wildcats start

Jackson.—For the second consecutive week 3 wildcat locations were announced last week in widely separated parts of Mississippi. The Tinsley Dome field, Yazoo County, which accounted for 2 new oil wells to bring the total of producers there to 27, also recorded one failure, a southeast edge test, and showed possibilities of a 1½-mile west extension.

In Copiah County, Sid Wheless started moving in materials, after completing a road to a location in NE NE 19-1n-3w, for a wildcat test, tentative location having been made several weeks ago.

In Madison County, E. L. Foster had derrick up and was moving in rig for Haffey 1, NEc South half Lot 5, 8-10n-5e, for a 5000-foot wildcat or reach Tuscaloosa (Woodbine). Location is on a 9000-acre block.

In Wayne County, Hill & Hill were rigging and had spudding machine on location for a 6500-foot wildcat on a geophysical prospect in C SW NE 5-9n-7w, on a spread of 10,000 acres.

Slick-Urschel Oil Company's Slick 1, NE NW 11-10n-3w, ½ mile west of

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Tinsley production, logged a 60-foot section of porosity with parts of it saturated and set casing at 4642 feet, 5 feet off bottom.

Whigate Oil Company's Robertson 1, NW NW 20-10n-2w, which logged 8 feet of oil sand in the Woodruff horizon, topped at 4988 feet, underlain with 16 feet of salt water sand, was abandoned at 5012 feet; elevation was 259 feet.

The two producers completed were both wells of Union Producing Company. Jennie Stevens 10, NW NW 12-10n-3w, flowed 37 barrels per hour after casing was perforated with 110 shots at 4768-4790 feet and with 50 shots from 4790 to 4804 feet. Jennie Stevens 13, C NE NW 12-10n-3w, was washed in flowing 16 barrels of oil per hour through ⅜-inch choke after 2½-inch tubing was swung at 4839 feet. Total depth was 4916 feet.

Hassie Hunt's A. G. Johnson 1, NE NE 14-10n-3w, set 7-inch casing at 4890 feet after a 15-minute drill-stem test from 4815-22 feet with ¼-inch chokes at top and bottom showed 1100 feet of salt water in the Stevens sand and operators were unable to complete a drill-stem test from 4775-4805 feet in the Woodruff sand. Casing will be perforated in the latter horizon.

Hill & Hill's Kinkead Plantation 1, SE NE 31-11n-3w, after being shut down for a week at 5358 feet, had a heaving hole and operators were experiencing trouble in getting to bottom. Robert P. Lake's Exum 1, SW NE 13-11n-2e, A Yazoo County wildcat, drilled chalk below 4495 feet after topping chalk at 4110 feet; elevation is 221 feet.

Fohs Oil Company has a unit detailing an area in township 3 north, range 2 west, Wilkinson County, near Woodville. Owenby Drilling Company is filling in a block it has in Smith County and Westbrook & Thompson are checking titles to a block of wildcat leases it has south of Meridian, Lauderdale County.

C. J. Davidson of Fort Worth has taken a block of leases in Mobile County, Alabama, near Springhill, Wilmer and Chuncula, west of the city of Mobile. J. Brian Eby has secured leases taken three years ago on considerable acreage in Mobile County by E. G. Nicar.

Geophysical Service has sent a geophysical unit to Waycross, Georgia, to work in Brantley, Clinch, Ware and adjoining south Georgia counties. One test is now being drilled in Clinch County, which has reached 736 feet. This is Georgia Resources, Incorporated's Gillican 1, 12 miles south of Homerville, which cemented 10-inch casing at 736 feet.

Louisiana permits

Forty-four drilling permits were issued last week by the minerals division, Louisiana Conservation Commission, of which 14 were for North Louisiana divided among the following parishes: Bossier 1; Caddo, 9; Morehouse, 3, and Webster, 1.

The thirty in South Louisiana were divided among the following parishes: Acadia, 1; Avoyelles, 6; Calcasieu, 2; Cameron, 1; East Baton Rouge, 4; Evangeline, 1; Iberia, 3; Iberville, 2; La-Fourche, 4; Plaquemines, 3; St. Landry, 1; St. Mary, 1; and Terrebonne, 1.

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Deep sand gives Wyoming first field for 1940

Casper, Wyo.—Sinclair-Wyoming Oil Company's West Ferris 4-E, CSE SW 29-26n-87w, West Ferris field, Carbon County, Wyoming, was officially completed this week, opening Wyoming's first new pool for 1940, a deep sand discovery. The well made 54 barrels daily flowing production at 4293 feet. Seven-inch production casing is set on top of saturation in the Tensleep formation at 4273 feet. The well drilled to 4326 feet where it picked up water in the base of the Tensleep and plugged back for completion. On April 1 at the Land Office in Cheyenne, the federal government is offering for lease at auction 400 acres, described as E SE 31, S NE, SW 32, and S NW 33-26n-87w. The acreage is located at its nearest point within ⅜ mile of the new producer.

The strike is the first well to drill below the Sundance in the West Ferris field. The field was opened in 1923 with a 37,000,000 cubic foot gas well, completed in the Dakota sand at 2126-56 feet. Eight wells were completed for gassers in the Dakota formation. In 1925 a 9 million cubic foot gas well was drilled to the Sundance and eight more wells were completed in that formation with depths ranging from 2570 to 3164 feet.

Largest completion this year in the Lance Creek field, Niobrara County, Wyoming, was recorded last week by Argo Oil Corporation's Elliott 12-A, CSE SE NW 5-35n-65w, which flowed 320 barrels per hour through the casing from the Joss at 5409 feet. Seven-inch production string was set on top of the Leo sand at 5165 feet. The well was completed with an acid wash-over and used carbonated mud. Largest completion in the Joss sand, it is located well up on the Lance Creek structure a considerable distance from other Joss production, including the discoveries of a little less than a year ago which were made on the east and west flanks of the field. The Elliott 12-A should stimulate drilling to this third deep productive zone, little developed, in the Lance Creek field.

Northernmost test of the Lance Creek field, Ohio Oil Company's Agnes Rohlff 6, SE NW NE 32-36n-65w, encountered water in the Leo sand at 5542 feet, and is deepening below 5500 feet for a test of the Joss sand.

Ohio Oil Company is waiting on cement to set around 10¾-inch casing at 337 feet in its State Lamb 8, NWc NW NW 36-36n-65w. The well is easternmost test located in the Lance Creek field proper and is ¼ mile east and a little north of the Continental Oil Company's Rodeo 3 OPC-4, SE NE NE 35-36n-65w, an oil placer claim completion of 1919 in the Dakota which recently was deepened from 3708 feet to recomplete in the Basal Sundance sand at 4315 feet for 7½ barrels per hour. It is a deep sand east extension.

Minnelusa Oil Corporation's Ford 1, CSW NW NE 33-36n-65w, an outpost on the north side of the field, and ¼ mile beyond Lance Creek production, completed for 113 barrels per hour through tubing at 5431 feet in the Leo sand.

Ohio Oil Company is moving rotary equipment to deepen Converse Sheep Company 8, CNW SE SW 32-36n-65w, completed in 1938 on the crest of the structure for 1,500,000 cubic feet of gas daily from the Leo sand at 4994 feet. It will recomplete in the Joss sand.

In other Wyoming areas several wells were at critical stages while several new operations got underway. In the Cole Creek field, Natrona County, General Petroleum Corporation's Government 1-21, CNW NW NW 21-35n-77w, ¼ mile northwest of the discovery, was drilling below 7868 feet in the Thermopolis shale, feeling ahead for the Dakota formation, first of the twin objective. Completion is planned in the next few weeks in the Dakota and Lakota sands with bottom at 8100 feet.

Sinclair - Wyoming Oil Company's Lost Soldier 91-A, SEc SE NE 10-26n-90w, Lost Soldier field, Fremont County, has cemented 7-inch production string on top of Sundance at 2001 feet, and was rigging up cable tools to drill into the sand. The slim hole rotary has been moved to new location, Lost Soldier 92-A, NE NW SW 11-26n-90w, which will be completed in the Sundance.

Vermillion Creek Oil Company, which has been suspended for a number of months in its test of the Vermillion

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Creek structure in the Hiawatha field area, Sweetwater County, southwestern Wyoming, resumed operations last week and was drilling at 2539 feet.

North extension test to the LaBarge field, Sublette County, southwestern Wyoming, the North LaBarge Oil Company's Government 1, SWc NE SE 8-27n-113w, is running 6-inch casing to 1850 feet. Well will be drilled to around 1975 feet where casing will be set. Test then will be drilled into the contact sand of the Almy formation of Tertiary age, resting unconformably on the Hilliard shale of the Cretaceous. The test is reported checking some 150 feet higher than other wells drilled in the area north of LaBarge production.

Campbell et al were drilling at 385 feet in Kyne 2, NW SE SW 22-43n-92w, a new location in the Kirby Creek field, Hot Spring County, northern Wyoming. The field is one of several in the Thermopolis area, and is expected to have an increased drilling program in 1940 because of the expansion of black oil refineries in that town.

A semi-wildcat in the Cut Bank area of northern Montana, Newell & Chandler's Anderson 1, CNE NW 1-36n-6w, on the Blackfoot Nose, Glacier County, had 500,000 cubic feet of gas from the Sunburst at 3000-05 feet, Upper Cut Bank at 3065-80 feet was dry, and the Lower Cut Bank, 3080-90 feet, carried a show of oil and some water. The well topped the Ellis lime at 3090 feet. The well is shut down at 3140 feet and operators may resume and carry the well to the Ellis-Madison contact, principal producing horizon in the Kevin-Sunburst field.

New Mexico

Maljamar area due more work following acreage deal

Hobbs.—Development of the Maljamar field, oldest producing area in Lea County, is to be expanded into sizeable proportions as result of the sale of Maljamar Oil & Gas Corporation's discovery block of state and federal permits to Canadian interests; entry of additional operating units, and the booking of crude contracts by a major purchaser. This expansive high-gravity-oil area which produces from broken Permian section between 3750 and 4100 feet, with a few wells in the 2300-foot sand, was discovered by the above concern in July, 1926. Isolation from market restricted drilling until Malco Refineries, Inc., was formed by the discovery company in 1931 to erect and operate a refinery near Artesia. The field currently has 35 producers, exclusive of gas wells, and is receiving its first active drilling campaign.

Texas Canadian Oil Corporation, which formerly operated under a foreign charter with operating headquarters at Arp, Texas, has contracted for the purchase of Maljamar Oil & Gas Corporation's holdings, including 21 wells with an allowable of 1014 barrels daily, and also the Artesia plant. The deal involves a cash payment of about $550,000 and an exchange of stock. P. D. Bowlen is president of the purchasing company, which is largely owned by Toronto, Canada, interests and has held production in the East Texas field since 1935. The drilling of 40 wells or more is proposed over a period of months by the purchaser.

Entry of Barney Cockburn et al and R. W. Fair et al, formerly active in the East Texas field, into the Maljamar field last fall with continuous drilling programs on acreage assignments from the discovery block boosted production sufficiently to attract a major buyer and a trunk line connection which augments an independent line to the Artesia district. Cockburn and associates are among the largest owners of acreage in the productive sections of the field and have negotiated a 20-well drilling program payable from production.

Tide Water Associated Oil Company recently entered the field as a purchaser, making 6 months contracts with producers on the basis of the Eddy County price schedule with a 10-cent advance due at the end of the period. The Texas-New Mexico Pipe Line Company extended its trunk line into the field to handle this purchased oil.

Maljamar field accounted for 3 of the 14 new operations listed the past week for Lea County. The former includes Green Bay Oil Company's Mitchell-Maljamar 2-A, C SE SE 6-17s-32e, offsetting a gasser, and George Williams and Weier Drilling Company's Miller 1, C NW SW 23-17s-32e.

In the Halfway pool, western Lea County, Sam Weiner et al's State 1, C S½ SW NE 16-20s-32e, is to be a northeast outpost for the 3-well area.

California

Shafter area wildcat drilling below 11,600 feet

Los Angeles.—Continental Oil Company's Community 1, wildcat in Section 12-28-24, Shafter area, was drilling below 11,600 feet in shale. It reportedly topped the Olcese at about 10,800 feet. Seaboard Oil Company and Union Oil Company have contributed to this venture.

The Pure Oil Company will attempt to extend Coalinga Nose production, Fresno County, with Schwinn 1, Section 30-19-16, south of production.

Continental Oil Company completed a fishing job at KCL A-5, Wasco pool, Kern County, swabbing it in for 2400 barrels at 13,157 feet, 20 feet in the producing section. Casing was cemented at 12,878 feet.

Schelnik 1, first operation of Columbia Oil Company in the Montebello extension, Los Angeles Basin, was completed for 322 barrels of 35.2-gravity oil and 2,000,000 cubic feet of gas from La Merced zone at 7656 feet. It flowed through a 50/64-inch choke and showed a tubing pressure of 550 pounds and casing pressure of 900 pounds.

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UNITED STATES WELL COMPLETIONS

Arkansas

Columbia County (Atlanta)—

Company, Well and Location	Init Prod. Bbls.	Depth
J. K. Mahoney et al, Riley 2, 14-18-19	285	8220

Union County (Rainbow City)—

Ouachita-Union Oil Corp., Ramsey 1, 26-17-14	*	4643

California

Orange County—

Pacific American Oil, No. 6 (Huntington Beach)	25	3876
Southwest Exploration, State 25 (Huntington Beach)	604	4595
Standard, Huntington "B"-64 (Huntington Beach)	81	4434

Los Angeles County—

George F. Getty, Pfister 1 (West Montebello)	375	7610
Standard, Braun 8 (West Montebello)	850	7660
Union, Howard & Smith 9 (West Montebello)	442	7645
Continental, L. A. C. F. C. D., 4, (Wilmington)	660	2979
Dumm Bros., (LB) 5, (Wilmington)	110	3465
Padreson Oil, No. C-1 (Wilmington)	75	3565
Ring Oil, "W" 1 (Wilmington)	80	3725
Union Pacific, UP P. D. (LB) 4	249	2787
Dominguez Estate Co., Fee 1 (Torrance)	*	7168

Kern County—

A. S. Mayes, No. 1 (Edison)	120	4222
Standard, Bryson 2 (Trico)	†3.54	2470
KCL 20-2 (Coles Levee)	241	9407
Dick & Dore, No. 20 (Kern River)	2	394
No. 21 (Kern River)	5	430
Texas Co., No. 38 (Midway Sunset)	89	3193
Richfield, James Slough KCL 1 (Ten Section)	*	10,250
Tide Water, KCL 65 (Coles Levee)	*	11,050
Richfield, KCL 83-29 (Fruitvale)	*	6015

Fresno County—

Robert S. Lytle, No. 24-18F (East Coalinga Eocene)	3012	7533
Texas, Anderson 2 (East Coalinga Eocene)	850	8165

Ventura County—

Tide Water, Lloyd 122 (Ventura Avenue)	1472	9465

Illinois

Clay County—

Pure, Scrugham 2, c w½ s½ sw 18-2n-8e	178	3986

Clinton County—

J. B. Allen, Bucholz 1, Lot 21, blk 2, 13-1n-1w	380	2913
C. Androde, Marshall-Pullet Hrs. 1, lot 12, blk 1, 13-1n-1w	581	2915
Egyptian, Gertskemper 1, se se ne 13-1n-1w	225	2904
Newton & Ward, Gross 1-A, se se sw 5-1n-3w	163	2400
Harry M. Miller, Wilson 1, 280 ft s of sw sw ne 2-3n-3w	*	676

Fayette County—

Gulf, Whitehead 7, 230 ft e of nw ne nw 6-5n-3e	55	1639
Ohio, Peters 1, c ne ne nw 36-6n-2e	100	1611
Texas, Eldridge 1, nw nw nw 5-6n-3e	*	1621
Ohio, Schwarm 4, 30 ft w of nw se sw 30-6n-3e	125	1562
Texas, Wright 1, se nw sw 31-6n-3e	147	1594
Carter, Durbin 17, ne se se 5-7n-3e	348	1576
W. C. McBride, Inc., Logue 6, sw ne sw nw 8-7n-3e	28	1549
Carter, Harper 4, ne sw sw 17-7n-3e	144	1551
Markham-Wilson et al, Rhodes 4, ne se sw sw 18-7n-3e	228	1540
Shell, Jedamski 5, se ne sw 21-7n-3e	110	1581
Van Beuning 5, sw ne se nw 28-7n-3e	80	1585
Carter, Griffith 13, nw c se 31-7n-3e	162	1588

Gallatin County—

Exchange, Housling 1, nw sw nw 7-8s-9e	*	3060

Hamilton County—

Alma Oil Co., Fed. Chem. & Coke 2, ne ne se 9-7n-6e	*	3105

Jefferson County—

S. M. McGee, Kasten 2, se ne ne 9-1s-1e	68	2086

Macon County—

Eureka Oil Corp., Rhodes 1, sw sw nw 28-17n-3e	*	2248

Marion County—

Texas Co., Bryant 15, ne c nw 9-1n-2e	126	1878
Magnolia, Young 82, 46 ft s of ne ne se 20-2n-2e	400	3457
Young 86, sw ne se se 20-2n-2e	752	3435
Young 87, nw ne ne se 20-2n-2e	400	3449
Young 89, nw se ne se 20-2n-2e	1200	3436
Ohio, Young Hrs. 36, se se ne sw 20-2n-2e	3624	3430
Young Hrs. 37, sw se se sw 20-2n-2e	6096	3430
Shell, Salem State Bank 5-C, 53 ft s of sw sw se 20-2n-2e	2172	3420
Salem State Bank 7-C, nw sw nw se 20-2n-2e	1420	3421
Texas, Young 24, se sw se ne 20-2n-2e	1100	3420
Young 25, nw se se ne 20-2n-2e	324	3439
Young 30, sw se se ne 20-2n-2e	462	3438
Tomberlin, Young 4, nw se ne se 20-2n-2e	720	3431
Magnolia, Young 90, sw c sw 21-2n-2e	1355	3445
Texas, Young 21, se sw sw nw 21-2n-2e	364	3467
Magnolia, Young 69, 200 ft n of ne se ne 28-2n-2e	120	2085
Shanafelt 38, se sw se sw 29-2n-2e	3120	3366
Texas, Shanafelt 19, 50 ft e of se ne ne 29-2n-2e	2300	3435
Telford 6, se c ne 29-2n-2e	920	3430
Magnolia, Shanafelt 32, sw nw se ne 32-2n-2e	4048	3435
Shell, Farthing 5-C, ne sw sw ne 32-2n-2e	5954	3456
Farthing 7-C, se ne sw ne 32-2n-2e	3719	3456
Texas, Farthing 9, 50 ft s of nw nw se 32-2n-2e	4000	3443
Lee 23, se ne ne ne 32-2n-2e	5130	3415
Roberts 8, sw se ne 32-2n-2e	10,200	3436
Johnson, Nichols 1, sw nw nw ne 19-3n-1e	*	1466
Absher & Booth, McMackin 6, nw sw sw sw 34-3n-2e	2396	3546
Jones & Deaton, Majonnier 2, se ne sw 28-4n-1e	*	2956

Richland County—

Pure, Montgomery 12, csl sw nw nw 4-3n-9e	170	2578
Hundley 7, 10 ft s of c se ne 5-3n-93	314	2588
Blair 1, c sw ne sw 24-4n-9e	57	2601
Snider 1, sw ne se nw 6-4n-10e	302	2915

Wabash County—

Burr Lambert, Bucholz 1, sw c ne 9-2s-13w	83	2432

[*Continued on next page*]

Summary of Drilling Operations in the United States, Week Ended March 16, 1940

	WELLS COMPLETED							*PERMITS FOR NEW WELLS				
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1940	Total this Date 1939	This Week	Total this Month	Total 1940	Total this Date 1939	Year Total 1939
Alabama	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	2	1	.....	1	285	41	54	4	6	22	46	223
California	24	19	1	4	9,342	273	219	18	43	227	218	11,36
Colorado	.....	.....	.....	.....	.....	2	5	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois*	70	58	1	11	68,806	737	835	72	151	837	.....	893
Indiana	5	3	.....	2	177	79	25	.....	.....	.....	.....	.....
Kansas	35	24	.....	11	45,562	321	264	41	82	352	261	1,583
Kentucky	3	1	.....	2	15	50	144	.....	.....	.....	.....	.....
Louisiana	15	10	3	2	1,032	317	207	44	78	288	250	1,449
Michigan	17	9	.....	8	1,335	276	251	24	54	280	215	1,419
Mississippi	3	2	.....	1	1,085	32	1	.....	.....	.....	.....	.....
Missouri	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	28	23	.....	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico*	11	11	.....	.....	4,883	165	141	17	38	175	.....	293
New York	23	22	1	.....	101	240†	105†	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	14†	9†	4	1	64	201†	182†	.....	.....	.....	.....	.....
Oklahoma	47	27	6	14	2,203	433	400	43	74	398	397	2,059
Pennsylvania	47†	43†	2	2	48	651†	302†	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Tennessee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	196	129	9	58	84,902	2,222	2,167	275	619	2,555	2,264	10,269
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	5	1	2	2	8	140	113	.....	.....	84	58	718
Wyoming	1	1	.....	.....	1,680	31	41	.....	.....	.....	.....	.....
Total this week.	518	370	29	119	221,528	6,206	5,480	538	1,145	5,178	3,709	19,470
Total last week.	486	358	34	94	238,707	5,600	5,018	607	607	4,640	3,263	.....
Total this year.	6,206	4,517	385	1,304	2,374,798	.....	.....	.....	.....	.....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Illinois date from October 15, 1939; New Mexico from Aguust 1, 1939.
† Includes water-input wells.

SOUTHERN

PUMPING UNITS

FOR CRUDE OIL OR REFINED LIQUIDS

- Pumps are either Rotary or Centrifugal.
- Motors are either Gas, Gasoline, Diesel, or Electric.
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THE RIDGE TOOL COMPANY, ELYRIA, OHIO

RIDGID PIPE TOOLS

ILLINOIS—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Continental, Dagne 1, nw ne nw 20-2s-13w	162	2481
Halstead Oil Gray 2, c se nw sw 29-2s-13w	*	2485
Washington County—		
Shell, Sharkowski 12, sw nw ne 23-3s-3w	21	1285
Wayne County—		
Oil Well Drlg. Co., Hilliar 1, cs½ se sw 27-1s-7e	121	3320
Steingle, Hilliard Cons 1, c n½ nw se 34-1s-7e	450	3290
H. H. Weinert, Brach 1, c w½ nw ne 4-2s-7e	544	3294
White County—		
Texas, Poorman 2, nw ne se 31-3s-8e	154	3279
Phillips, Cleveland 1, nw ne se ne 36-4s-10e	*	3095
Roberts Bros., Barcroft 1, sw ne sw nw 25-6s-8e	*	3100
J. B. Barnes, Martin 1, c w½ nw sw 7-6s-9e	30	3103
Eason, Storms 1, se sw se 11-6s-9e	393	2284
Eason & Angle, Storms 4, nw se se 14-6s-9e	180	2267
Storms 5, ne sw se 14-6s-9e	280	2269
Exchange & Ohio, Rudolph 2, sw ne ne 14-6s-9e	*	2335
Boone et al, Storms 1, se sw ne 23-6s-9e	1½	2269

Indiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Lawrence County—		
Favorite O&G, Shortridge 1, 18 ft s of se ne sw 27-5n-3e	*	720
Posey County—		
Somers & Egan, Keck 2, se nw ne 34-3s-14w	77	2568
nw nw nw nw 35-3s-14w	59	2810
Spencer County—		
Sturbois, Boyd 1, ne ne 31-7s-6w	41	930
Sullivan County—		
Salem Oil, Woodward 1, nw c nw 7-8n-9w	*	1700

Kansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton County—		
Hinkle et al, Burmeister 1, c n½ nw sw 27-16-11w	2242	3365
Barnsdall, Rous 3, c n½ se sw 28-16-11w	3000	3358
Texas, Janssen 1, c e½ ne se 31-16-11w	534	3341
Sinclair Prairie, Dolechek 1, nwc 32-16-11w	*	3361
Sharon, Noe 1, nec 14-20-11w	2499	3310
Butler County—		
National, Smith 1, ne nw se 9-28-5e	*	3213
Cowley County—		
Brewer, Zerger 2, c e½ sw ne 33-30-4e	*	3067
Ellis County—		
Darby, Henderson 5, c s½ ne nw 7-11-17w	2591	3493
Gulf, Mai 8, c s½ nw sw 14-11-17w	2348	3366
Wakefield, Burnett "A" 3, c e½ se se 1-11-18w	3000	3460
Skelly, Kempe 1, c s½ sw ne 12-11-18w (otd 3376 ft)	3000	3382
Republic Natural, Bemis "B" 4, c s½ ne nw 4-12-17w	296	3601
I. T. I. O. Co., Staab 2, c n½ nw nw 11-12-18w	3000	3659
Ellsworth County—		
Phillips et al, Stoltenberg 1, nec sw 28-16-10w	241	3328
Continental, Buehler 4, nw sec ne 33-17-8w	862	3225
Cities Service, Wessler 2, csl se ne se 19-17-9w	2163	3228
Skelly, Moran 5, c s½ se se 31-17-10w	3000	3225
Zink 5, c s½ sw sw 32-17-10w	3000	3232
Greenwood County—		
Gorden et al, Robertson 1, nwc 20-24-11e	*	300
Johnson County—		
Gardner Oil Co., McCann 1, ne nw ne se 15-14-22e	7	850
Lyon County—		
Moss, Pixlee "B" 2, se nw se 34-21-10e	*	2188
Marion County—		
Polhamus et al, Noone 1, nwc se 18-18-3e	*	2907
Reno County—		
Shell, Frazee 1, ne se ne 33-25-8w	*	4280
Rice County—		
Gulf, Stout 5, c s½ nw ne 6-18-10w	3000	3230
Saco, Hohl 1, c se nw 12-18-10w	*	3298
Bishop, Reese 2, nw ne nw 22-19-9w	60	3106
H. & M. Drlg. Co., Geminhardt 1, c s½ ne ne 28-19-10w	*	3320
Russell County—		
Wakefield et al, Schmidtberger 1, c n½ ne sw 17-13-15w	*	3353
Texon, Hall 3, c w½ sw se 26-14-13w	772	2880
Aylward, Rusch 1, sw se se 30-14-14w	2961	2983
Skelly, Neidens 12, se sw ne 32-15-13w	2757	3341
Murfin et al, St. Aubyn 1, c s½ sw se 1-15-13w	*	3259
Stafford County—		
Stanolind, Heggy 1, c e½ ne ne 10-24-11w	3000	3798
Fuller 9, c w½ sw sw 11-24-11w	1194	3822
Sumner County—		
Hawkeye, Blair 1, swc 7-30-1e (otd 3875 ft)	35	3878

Kentucky

Company, Well and Location	Init. Prod. Bbls.	Depth
Daviess County—		
Cane Run Pet., Jackson 15	15	673
Hancock County—		
Ohio, Edwards 1	*	1130
Muhlenberg County—		
Shearin Coal Co., Pratt 1	*	1599

North Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Bossier Parish (Sligo)—		
Triangle Drlg. Co., Skannal A-5, 13-17n-12w	200	3145
Caddo Parish (Pine Island)—		
D. L. Butler, Browning 1, 28-22n-16w	*	2743
J. W. Bailey, Gibbs 1, 7-20n-15w	40	1535
Murray Samuel, Howard 1, 1-20n-16w	50	1480
Southern Oil Co., Muslow 2, 5-20n-15w	35	1556
Stanolind, Lane 1, 25-21n-15w	5	1569
Slattery 13, 21-21n-15w	12	1593
H. J. Strief, Noel Estate 2, 12-20n-16w	45	1540
Texas Co., S. A. Guy 2, 1-20n-16w	25	1510

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ALEMITE LUBRICATION...STEEL SHEAVES

The McKissick Peerless Snatch Block is safely locked by a spring plunger in the locking key which holds the key in position until released by turning to right. Available with Swivel Hook, as illustrated, and also with Swivel Clevis. Made in two sheave diameters—6" and 8" for wire line or Manila rope as specified.

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United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo Parish (Shreveport)—		
Bobby Manziel, City of Shreveport 1, 35-18n-14w	450	5577
Morehouse Parish (Monroe)—		
Southern Carbon Co., Tensas Delta 27, 2-21n-4e	¶1½	2225
Sabine Parish (Converse)—		
C. H. Smith, Whitney Corp. 1, 24-10n-14w	*	3300
Sabine Parish (Zwolle)—		
P. C. Alexander, Tilley 1, 30-8n-12w	170	2560
Union Parish (Monroe)—		
Memphis Nat. Gas Co., Langford 5, 3-21n-3e	¶1½	2198
Wilson 1, 2-21n-3e	¶2½	2200

Michigan

Allegan County—		
Spencer Cook, Schaap A-1, ne se se 33-4n-14w	*	1539
Wiser Oil Co., Jurries 2, se nw se 34-4n-14w	170	1484
W. R. Borough, Inc., Fein 3, se nw nw 2-4n-13w	*	1730
Wilson & Atha, Bachman 1, sw sw sw 4-4n-13w	*	1830
Salem G. & O. Co., Brenner 2, nw se sw 14-4n-13w	65	1598
Isabella County—		
Wicklund Dev. Co., Busch 1, se sw sw 9-16n-3w	35	3718
Cities Service, Allen 1, se se ne 17-16n-3w	400	3705
Gulf, Burch 1, ne se nw 17-16n-3w	375	3743
Kent County—		
North American, Lamoreiux 1, sw sw nw 28-8n-10w	*	2258
Smith & Strom-Wagner, Van Poortvliet 1, nw ne se 28-7n-12w	40	1904
Wolverine, Thelen 1, se se se 31-7n-12w	*	2140
Voorhees Dr. Co., Story 3, sw sw sw 32-7n-12w	*	1927
Ottawa County—		
Smith Pet. Co., Masterson 4, nw se se 23-7n-13w	50	1886
E. B. Strom, Masterson 1, se ne se 23-7n-13w	125	1890
Weller & Dapars, Powers 1, sw ne nw 28-8n-13w	*	1964
Van Buren County—		
Bloomingdale Dev. Co., Babcock 2, nw nw ne 18-1s-14w	75	1193
W. E. Frude, Allen 1, ne nw se 28-1s-15w	*	1181

Mississippi

Yazoo County (Tinsley Dome)—		
Union Prod. Co., Stevens 10, 12-10n-3w	700	4804
Stevens 13, 12-10n-3w	385	4916
Whigate Oil Co., Robertson 1, 20-10n-2w	*	5012

New Mexico

Eddy County—		
G. M. Cone et al, Guy 2, nec se 9-18s-29e	720	2539
Guy 3, ne se se 9-18s-29e	840	2547
R. W. Fair et al, Brainard 4, nw sw se 10-18s-29e	888	2586
Flynn-Welch & Yates, Langford 2, sec nw 9-18s-29e	425	2497
H. E. Yates et al, Yates 4-A, nec sw 6-18s-30e	480	2850
Lea County (Maljamar)—		
R. W. Fair et al, Baish 2-B, c se ne 27-17s-32e	720	3953
Lea County (Penrose)—		
Gulf Oil Corp., Mattern 3-D, sw se nw 7-22s-37e	120	3750
Lea County (Skelly)—		
Skelly Oil Co., King 3-A, c se sw 33-22s-37e	62	3700
Golden Oil Co., Flora-Gulf 1, c ne nw 8-23s-37e	100	3680
Lea County (Vacuum)—		
Magnolia, State-Bridges 54, c se se 14-17s-34e	360	4660
State-Bridges 55, c nw ne 23-17s-34e	168	4625

New York

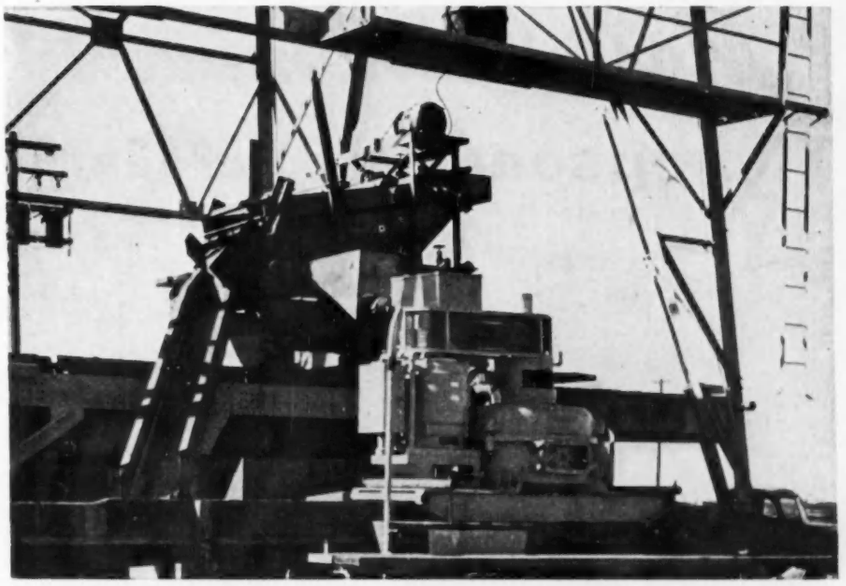
Allegany County—		
H. Sloan, Agt., Albert Oil Co. farm, Bolivar	15	1290
Sawyer & Martin, Wasson farm, Bolivar	8	1390
Lemont O. Co., Pierce farm, Wirt	7	1338
R. B. Moore No. 6, Thomas farm, Bolivar	6	1370
M. J. Crowley et al, Coast et al farm, Bolivar	5	1368
Carl O. Co., Robinson farm, Scio	6	1065
Bradley Prod. Corp., Monitor farm, Alma	5	1352
L. H. Richardson et al, Scott farm, Alma	6	1540
Summitt O. Co., Doty farm, Scio	3	1178
Marsh O. Co., Withey farm, Bolivar	7	1370
L. H. Thornton et al, Brown farm, Alma	9	1366
Bliven Hill O. Co., Norton-McEwen farm, Scio	5	912
Bolivar O. Co., Mallory farm, Wirt	5	1342
A. C. Shaner O. Co., Childs farm, W. Clarksville	5	1270
Jacob Trenkle Est., Hill farm, Genesee	5	1360
Frank Comstock, Lane farm, W. Clarksville	4	1341
Cunningham Nat. G. Co., Byron Fanton farm, Willing	¶5	4948
Water Intake Wells—		
Forest O. Co., Ackerman farm, Bolivar	..	1429
Ackerman farm, Bolivar	..	1410
V. V. V. Franchot, Reddy farm, Alma	..	1452
L. E. Norton, Coats farm, Scio	..	1190
Floyd O. C., Yeager farm, Wellsville	..	1267
Gray O. Co., Smith-Gray farm, Genesee	..	1410

Ohio

Athens County—		
A. D. Townsend, Leoffler 2	¶.05	1695
Knox County—		
Sterl C. Brown et al, Hoss 1	¶.18	2540
Lawrence County—		
Portage Producers, David 1	¶.75	2990
Licking County—		
Tiston W. Patten et al, Wright 5	2	744

(*Continued on next page*)

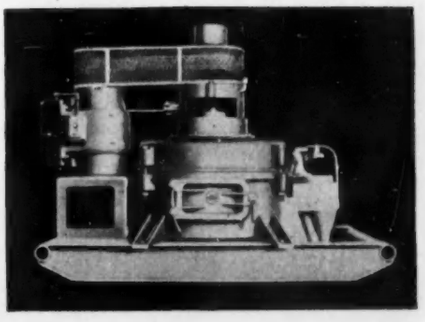
RECLAIM Weighted Mud for RE-USE



Merco Type A-24 Concentrator operated by a Major Oil Company, at Rio Bravo, California, reclaiming concentrated weighted mud from an abandoned sump.

The Merco Type A-24 Concentrator recovers valuable, concentrated weighted mud from abandoned mud. At Rio Bravo, California, a sump estimated to contain weighting material valued at $30,000.00 is yielding a 90% recovery of weighted mud, concentrated at 120 lbs./cu. ft.

On drilling operations, the *Merco Concentrator* is used to maintain mud weight and fluidity without waste of costly weighting material. This is accomplished by continuously concentrating the weighted mud and remerging it with the circulating mud stream.



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MERCO

TYPE A-24

CONCENTRATOR

MERCO CENTRIFUGAL CO., DIV. B-1, 343 Sansome St., San Francisco, California

Company, Well and Location	Init. Prod. Bbls.	Depth
OHIO *(Continued)*		
Medina County—		
Marine Trust Co., Shaw A-6	5	341
Thornton Prod. Co., Sanford & Watson F-1	5	373
Sanford & Watson F-2	5	380
Sanford & Watson O-20	I	334
Sanford & Watson O-21	I	365
Muskingum County—		
Sutton Bros., Bussemer 1	¶12	4075
Perry County—		
Palm Oil Co., Davis & Davis 1	25	3410
B. G. Davis, Allton Hrs. 1	2	1253
Washington County—		
Wm. A. Cave et al, Rinard 5	20	1390
Henning & Hall, Liebrand 1	*	2005

"I" indicates water input well.

Company, Well and Location	Init. Prod. Bbls.	Depth
Oklahoma		
Caddo County—		
Johnson et al, Kahle 1, se sw nw 3-5n-9w	*	4521
Peoples, Wagner 2, ne se ne sw 3-5n-9w	*	3531
Olson, Rigney 2, ne ne se nw 12-5n-9w	101	4320
Carter County—		
Turner, Smith 1, ne sw se 16-3s-1w	*	3640
Barrett, Hinkle 20, nw swc ne 20-3s-2w	3	252
Cox-Harmon, Jackson 4, se sec nw 15-4s-2w (otd 1970 ft)	30	2285
Sinclair Prairie, Holman 16, se nw ne sw 16-4s-3w	24	1270
Creek County—		
Sturn, Beaver 1, swc ne 32-14n-8e	*	100
Salisbury, Inc., Pierpont 1-A, c sw sw 9-16-7e	8	1488
Zephyr Drlg. Co. et al, Brown 1, ne se se 19-16n-10e	*	2889
Harwell, Chisolm 3, nec sw 3-17n-9e	90	2091
Kirchner, Baker 1, nw ne se 20-17n-9e	*	2690
Midco, Bruner 1, ne nwc sw 29-17n-11e	¶2.5	2184
Link Oil Co., Mickey 2, swc nw 33-18n-7e (otd 1409 ft)	*	2739
Bryan, Willibey 2, nec sw 22-18n-9e	¶3	2050
Grady County—		
Magnolia, Harrison 10, se nw ne nw 28-3n-5w	29	2392
Jackson County—		
Gulf, Barrett 4, swc 10-1n-20w	17	1614
Burnham et al, Guyerman 4, c nw sw 14-1n-20w	60	1473
Burnham, Sumner 6, se nw se 6-1s-19w	60	2613
Okfuskee County—		
Winona, Hen 2, ne ne nw se 16-10n-11e	*	3055
McIntyre, McMahon 1, nwc se 36-11n-9e	100	3821
Oklahoma County—		
Phillips, Harrell 1, nw ne sw nw 2-11n-3w (otd 6542 ft)	¶1.3	6150
I. T. I. O. Co. et al, Park 8, swc nw 13-11n-3w (otd 6364 ft)	173	4079
Clauer 14, nw ne se 25-11n-3w, (otd 6456 ft)	30	6463
Okmulgee County—		
Selby, Flint 12, c se nw 26-14n-14e	14	1022
Dow, Monday 1, sw swc ne 33-15n-14e	15	1622
Osage County—		
Norris, 2, se sw se 15-21n-12e	9	1310
Craig et al, 7, ne sw nw ne 8-22n-11e	*	1150
I. T. I. O. Co., 466, ne ne nw sw 29-26n-11e	¶1.5	1804
Sagamore, 405, ne sw ne 36-28n-10e	¶.89	819
Pawnee County—		
Portable Drlg. Co., Turner 1-A, se nw sw 3-20n-7e	45	2167
Payne County—		
Gardner, Wetzel 1, ne sw se 2-18n-1e	*	5076
Pontotoc County—		
Magnolia, Metropolitan Life 22, nwc ne 27-2n-7e (otd 3765 ft)	85	2550
Roy Starr O&G Co., Bowlby 1, swc nw 29-5n-4e	*	2908
Senora, Porter 1, nec 35-5n-4e (otd 2513 ft)	140	2606
Minton et al, Harris 3, sec nw 35-5n-7e	*	2445
Pottawatomie County—		
H. Phillips, Bettis 4, sw se sw 21-7n-4e	535	4301
I. T. I. O. Co., Weems 6, sw nw sw 21-7n-5e	69	2777
Gulf, Johnson 2, sw se nw 29-7n-5e (otd 4117 ft)	217	4172
Dunnett, Rogers 1, ne se sw 31-11n-4e	285	4484
Seminole County—		
Martin, Earles 1-A, ne se nw 33-9n-6e	40	2575
Stephens County—		
Luther, Operton 3, se se ne sw 27-1s-5w (otd 630 ft)	*	858
Skelly, Glass 17, c s½ sw se 33-1s-8w (otd 2244 ft)	3	2265
Pace et al, Montgomery "C" 3, ne sw nw se 11-2s-8w	18	2022
Pace, Parker 2, nw nw se se 11-2s-8w	3	1766
Wagoner County—		
Tartner et al, Rittenhouse 3, sw se nw 16-17n-17e	¶.57	777
Southwestern Oil Co., Seriba 1-A, se ne se 25-17n-17e	*	748
Pennsylvania		
Bradford District—		
Marion L. Boyle et al, Duke	2	....
M. Hungiville, McCullough	1	....
Underwood & Moody, Loop	1	....
Pine Run Oil Co., Bing 130-1-2-3-4-6 (5 wells)	4	....
Tapp, Gallets & Buffington, Trs., fee	5	....
N. V. V. Franchot, Mgr., Trustee, John Brandel Heirs	5	....
Pure Penn O. Co., Inc., Kinley Oil Co.	3	....
Forest O. Corp.	1	....
Forest Pet. Corp., 2 wells	2	....
Niagara Oil Corp., 4 wells	4	....
Bradford Transit Co., 12 wells	12	....
Water Intake Wells—		
Andrus & McDowell, 321 Bing	..	....
Mix Creek Oil Co., fee	..	....
Forest Oil Corp., 2 wells	..	....
Niagara Oil Corp., 4 wells	..	....
Middle District—		
C. S. Enart, G. V. Stull	½	....

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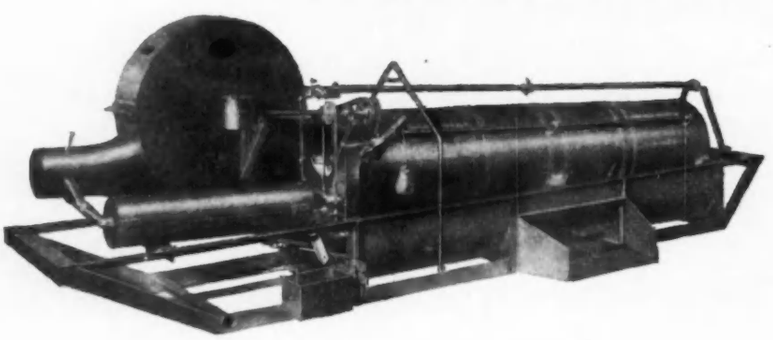

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United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Hughes Oil Co., William Critchenlow	1	....
Water Intake Wells—		
Joseph Karl et al, Lot 106	..	....
Butler Armstrong District—		
Rankin & Snow, Cross & Rankin	1	....

SOUTHWEST PENNSYLVANIA

Greene County—		
Equitable Gas Co., Conklin 2	¶.22	2316
Indiana County—		
T. W. Phillips G. & O. Co., R. & P. Coal 1	*	3481
Washington County—		
Union G. & O. Corp., Conn 828	5	1001
Keystone Dr. Co., Davidson 1	¶.16	2426
Westmoreland County—		
Peoples Nat. G. Co., McCutcheon 1	*	3835

Texas Panhandle

Carson County—		
Ryan Consolidated Pet. Corp., block 13	625	3160
Shell, Cooper 6-A	350	3312
Gray County—		
King Oil Co., Vallmert (north) 13	492	3285
Magnolia, C. S. Barrett 11	248	3295
Shell, Combs-Worley 4	250	3020
Skelly, H. Schafer 105	406	3328
Hutchinson County—		
J. E. Crosbie, Inc., Pitts 29	581	2890
Phillips, Thompson (Erle) 2	396	3019
Moore County—		
Canadian River Gas Co., Kilgore 3-A	¶8½	3326
Phillips, W. O. Harris (Alda) 1	¶24	3520

East Texas

Joiner Area—		
Constantin & Co., Thompson 3 (7.38-ac)	120	3546
Kilgore Area—		
American Liberty Oil Co., Sabine River 12, Tr. No. 7	2200	3460
Overton Ref. Co., I&GN 4-B (7.88-ac)	720	3562
C. R. Starnes et al, Money 53 (370.7-ac)	240	3729
Longview Area—		
Sun, Shoults 16 (90.28-ac)	7000	3625
Angus Wynne et al, Stuckey-Thrasher 1 (45/100-ac)	3000	3560
Anderson County (Cayuga)—		
J. R. Bunn Drl. Co. et al, Royall-Cone-Tide Water 1-C	¶½	4030
Philtop O&G Co., Ware-Tide Water 3 (140-ac)	¶85	4067
Tide Water Associated & Seaboard, Duncan 1-B	¶18	4096
Franklin County (Talco)—		
Texas Co., Barker 11 (468.39-ac)	183	4287
Limestone County (Wildcat)—		
Zephyr Oil Co., Carrie Peeples 3	*	2868
Navarro County (Flag Lake)—		
S. N. Rowan et al, Trinity River 1	503	2994
Red River County (Wildcat)—		
Kansas-Oklahoma Pet. Corp., R. H. Ringwald 1	*	955
Titus County (Talco)—		
V. A. Hughes & Co., Flannigan-Shell 4	505	4344

West Texas

Crane County (Dune)—		
Gt. Western Producers, University 1-C	305	3321
Crane County (Gulf-Waddell)—		
Gulf, Waddell 29	6697	3494
Crane County (McClintic)—		
Shell, McClintic 7-A	208	3065
Ector County (Foster)—		
Barnsdall, M. Witcher 3	1041	4190
Broderick & Calvert, Witcher 19	1679	4175
M. J. Delaney et al, Johnson-Conoco 1	344	4165
Schermerhorn Oil Corp., Johnson-Amerada 7	961	4200
Sunray Oil Co.-York & Harper, Witcher 4-B	228	4305
Ector County (Goldsmith)—		
Gulf, Goldsmith 254	528	4202
Goldsmith 257	1675	4230
Landreth Prod. Corp., Scharbauer 10-M	464	4177
Phillips-Pure, Cowden 76	920	4162
Ector County (North Cowden)—		
M. J. Delaney et al, R. W. Smith 7	1278	4415
J. M. Rush et al, Midland Farm Co. 2	24	4504
Fisher County (Wildcat)—		
Montour Prod. Co., Taggert-Tidal 1	*	5664
Gaines County (Wasson)—		
Continental, Moore 4-46	541	5000
Lynn County (Wildcat)—		
H. F. Wilcox O&G Co., Powell 1	*	5182
Pecos County (Lehn)—		
Sahara Oil Corp., Sullivan 8-B	107	1695
Pecos County (Pecos Valley)—		
Stanfield & A. C. Walker, Reed 3	45	1675
Pecos County (Yates)—		
Ohio Oil Co., Smith 13	654	1413
Pecos County (Wildcats)—		
H. L. Cain et al, Lehman-Cities Service 1	*	1686
R. E. Clawson et al, Lehman-Cities Service 1	*	53
Upton County (Gulf-McElroy)—		
Gulf Oil Corp., Crier-McElrot 39	3721	2815
Upton County (McCamey)—		
Gulf, King Ranch Oil & Lignite Co. 2	190	2727
Ward County—		
W. A. Black & Sons, Texas Cotton Ind. 5	255	1921
Westexas Oil & Roy. Corp., University 6-C	2838	2671
Winkler County (Halley)—		
Skelly, Halley 38	1943	2885
Winkler County (Keystone)—		
Gulf, Keystone 35	497	3382
Yoakum County (Wasson)—		
Aloco J. E. Hill 2	756	5216
Anderson-Prichard, Willard-Gibson 1-759	1620	5200
Honolulu Oil Corp., Willard 7-741	1264	5210
Humble, Wooten 25	462	5121
Mabee O&G Co., Willard 20	1006	5220
Willard 2-C	1731	5165
Oil Dev. Co., Willard 3-761	1587	5200
Osage Drl. Co., Claywater-Amerada 5	649	5235
Shell, Baumgart 13-C	1160	5178
T. P. Coal & Oil Co., Bennett 28	1822	5225

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INDIANAPOLIS, INDIANA, U.S.A.

United States Well Completions—*Continued*

West Central Texas

Company, Well and Location	Init Prod. Bbls.	Depth
Brown County (Wildcat)—		
H. P. Evans et al, Evans 1	*	700
Brown County—		
McCullum & Forbes, Williams 2	*	620
Callahan County—		
B. & F. Cotton Bonder Warehouse Co., Ogle 1	*	418
Reeves et al, Alexander 1	*	1319
C. D. Robart et al, Grandy 1-A	¶1.5	614
Valley Osage Oil Co.-H. T. B. Prod. Co., Slaughter 2	*	400
Callahan County (Wildcat)—		
Hunter & Graham, Leggett 1, sec 7	*	1835
Coleman County—		
E. E. Thate et al, fee 1	*	862
Comanche County—		
L. H. Choate et al, Anderson 1	*	659
Day & Cawley, Walker 1	*	625
St. John & Choate, West 2	5	602
Coryell County (Wildcat)—		
T. D. Wallace et al, M. Murray 1	*	612
Jones County—		
Fain-McGaha Oil Corp., Shaheen 8	295	1883
Humble, Irwin 2	*	3015
Petroleum Producers Co., McKeown 3	269	1884
Shackelford County—		
J. L. Hart et al, Lee 5	*	449
Roeser-Pendleton, Inc.-Continental, Cook 4-A-113	¶1.9	1582
R. Sharrock et al, Blanton 4	5	523

North Texas

Company, Well and Location	Init Prod. Bbls.	Depth
Archer County (Hull-Silk)—		
Cato Oil Co., Anderson 2	1464	4412
C. B. Christie et al, Little 4-B	1104	4365
Continental Oil Co., Wilson-McCrory 9	1488	4373
Dillard-White & Duncan, Nichols 3	736	4390
Bert Ligon et al, White 1-A, lot 2	760	4421
Louis Sikes et al, Martin 1-A	472	4424
Archer County—		
W. B. Hamilton Pet. Co., Ikard 7-C	*	1167
Archer County (Wildcats)—		
C. W. Clark et al, Strange 1	*	1154
Jim Fish et al, Clagett 1	*	1216
Baylor County (Seymour)—		
British-American O. P. Co., Fowlkes 4	604	2538
Clay County—		
L. T. Burns et al, Hamilton 4, blk 83	*	233
E. N. Costley et al, McInness 3, blk 58	216	1122
Perkins & Cullum, Taylor 4, blk 36	288	1094
Taylor 5, blk 36	*	1364
Clay County (Wildcats)—		
L. T. Burns et al, Lyon 1	*	1436
Mullens 1, sec 2617	*	3655
Dresser et al, C. H. McClellan 1	*	1350
Cooke County—		
Seitz-Comegys & Seitz, Inc., Luke 2	*	1278
The Texas Co., Truebenbach 6-B	*	981
Cooke County (Walnut Bend)—		
Sinclair Prairie, McGeorge 8	580	4942
Jack County—		
Harper & Knappenberger, Winn-Lowrance 1-B	*	3530
Jack County (Wildcat)—		
Paul Steed-Joe Cooper, Mathis 1	251	2884
Montague County (Benton-Holmes)—		
Joe Benton-J. W. Holmes, First Nat'l Bank (St. Jo) 1	*	4078
Montague County (Nocona)—		
Rogers & Rogers, Astley-Texaco 3	1528	5266
Wichita County (K-M-A)—		
R. P. Dorian-Mitchell Oil Co., Mitchell 11	536	3924
E. C. Oil Co., Mangold 24	832	3822
P. G. Lake, Inc., Griffin-Reilly 6	1088	3928
Ross Drl. Co.-King Oil Co., Waggoner Bros. 3	240	3881
The Texas Co., Thom 3	816	3843
Mrs. H. B Wallace et al, Strauss-Deep 2	828	3785
Wichita County—		
J. E. Farrell et al, Waggoner Bros. 29-C, lot 17	56	1399
Grace & Wood, Love 6, blk 12	*	654
C. A. Johnston et al, Bentley 1	*	1443
Van Houston 1, sec 39	*	420
S. H. Walton et al, Gulf Tank Farm 15, sec 23	13	584
Wichita County (Wildcat)—		
Perry Browning et al, Hoge 1, blk 33	*	900
Wilbarger County—		
W. H. Hammon, Hanlon & Buchanan, Owens 3	960	3198
King Oil Co., Waggoner Est. 10-N, sec 104	55	1435
Wilbarger County (Wildcat) —		
H. G. Gay et al, Ross 1, sec 65	*	2501
Young County—		
Cosden Pet. Corp., Steele 1	¶22.2	3911
Long & Ray Oil Co., Bills 3, sec 1971	537	2811
Bills 5, sec 1971	520	2812
Moran & Wotola Roy. Co., Howard 17, sec 3401	32	910
Henry Zweifel et al, Vaughn 2-B-A	715	4011
Young County (Wildcat)—		
Ed Fulton et al, Clifton 1, sec 92	*	1223

South Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Brooks County—		
Humble, McGill Bros. 58 (Kelsey)	325	4746
Calhoun County—		
Buchanan Prod. Co. and Blanco Oil Co., Morris & Dunwoody 18 (Heyser)	500	5489
Jackson County—		
Lonnie Glasscock, Drummond 1-A (West Ranch)	500	5986
Magnolia, Nannie B. West 41-A (West Ranch)	950	5790
Superior, J. H. Drummond 2 (West Ranch)	1100	5600
Texas Co., Mortgage Land 2 (Ganado)	45	5108
Jim Wells County—		
Henshaw Bros., W. E. Gaither 1 (WC), Anita sur	*	5769
H. H. Howell and E. C. Hubble, T. W. Bell 1 (Premont)	150	2362
Reese & Dunn, Perez 1 (WC), Sec 6	*	5510
Live Oak County—		
Clark Dr. Co., Kibler 1 (White Creek)	*	1550
Harry Hotchkin, South Texas Nat'l Bank 1 (WC), sur 10	*	2161
Nueces County—		
Hiawatha O&G Co., Smith 8-B (Saxet)	100	10,892
Pan American, Robert Driscoll Est. 3 (Clara Driscoll)	300	3819
Seaboard, John La Prelle Est. 5-A (North Luby)	76	5150
San Patricio County—		
H. W. Battaile & Knisley, Flaerke 1-B (Midway)	325	5325
Baytex Oil Corp., Peoples & Nichols 1 (McCampbell)	500	7604
A. F. Carter, Brown 1 (McCampbell)	*	7350
Esves Oil Co., Dimmick 1 (Plymouth)	¶10	5651
Tom Graham Oil Co., McCampbell B-4 (McCampbell)	150	7520
Victoria County—		
Colton & Colton, C. C. Bucholz 1 (WC), Hidalgo sur	*	5400
W. V. Hardin, Buckert 1 (Victoria)	700	3044

LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County—		
G. W. Basom, Adami 1 (WC), sur 341	*	1291
Cox & Hamon & Gorman-Yoakam, Charles Hoffman 3 (107), (Tarancahuas)	260	2054
Henderson Coquat et al, M. Momeny Est. 1 (North Sweden)	*	6025
Humble, DCRC F-4 (Cedro Hill)	76	1428
DCRC F-5 (Cedro Hill)	50	1555
Magnolia, DCRC 25 (189), (Cedro Hill)	20	1439
Jim Hogg County—		
Colorado Octane Co., Mortinez (Trevino) B-3 (Colorado)	325	3015
Humble, King Ranch-Colorado 3 (Colorado)	300	3055
Mestina O&G Co. 3 (5) (WC), Baluarte grant	*	6383
McMullen County—		
Gorman & Yoakam, NL&IS Co. 1 (WC), sur 1	*	1768
Starr County—		
Humble, McGill Bros. 62 (Kelsey)	250	4764
Sun, Amanda McKinney 8 (Sun)	175	4982
Syndicate Oil Corp., Sanchez 1 (WC), sur 344	*	988
Zimmerman, Ben D. Wood 1 (WC), por 84	*	2210
Webb County—		
Humble, Yaeger 4 (Adami)	40	990
Magnolia, Benavides 24 (Volpe)	*	2628
Manly & Campbell, Benavides 9 (West Cole)	22	2334
H. E. Poe et al, Adami 4 (Adami)	77	974
Zapata County—		
George Buck, I. G. de Trevino 7 (Escobas)	83	1408
Buffalo Oil Co., Hinnant 10-C (Mirando Valley)	92	1988
Hinnant 12-C (Mirando Valley)	60	1982
Interstate Minerals, Lopez 35 (Mirando Valley)	100	1733
J. P. Nash, Haynes 34 (Comitas)	20	1157

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Bexar County—		
Philtop O&G Co., Patton 2-A (WC), Rodriguez grant	*	1946
Guadalupe County—		
C. E. Eaton, Volkman 1 (WC), Wilson sur	*	1025
Wellington Oil Co., Beaty 1 (WC), sur 10	*	3870
J. E. West, Hartfield 1 (Elm Creek)	7	775
Williamson County—		
Roesener & Park, Zeishang 1 (Byersville)	*	1031

Texas Gulf Coast

Company, Well and Location	Init Prod. Bbls.	Depth
Anahuac—		
Gulf, Peterson 3	195	7139
Humble, Garth 1-B	463	7163
Clear Lake—		
Humble, Humble-West Fee C-34	162	5843
Dickinson—		
Pan American, Stewart 1	240	8895
Eureka—		
Bybee & Synott et al, Fee 1	247	7743
Fairbanks—		
Gem, White 3	136	6831
Hardin—		
O. W. Dyer, Finley 1	95	7600
Humble, Partlow A-15	585	7620
Partlow A-16	386	7615
Magnet—		
Pan American, Halamick 1	108	5545
Martha—		
Stanolind, Ross 1	79	8146
Orange—		
Gulf, Granger 5	162	5975
Pickett Ridge—		
Texas Co., Pierce Estate A-35	133	4794
Segno—		
Gulf, Wing 29	627	8067
Thompson—		
Quintana Pet. Corp., Wolters B-5	357	5445
West Columbia—		
Texas Co., Phillips 13	179	6375
Withers—		
Texas Co., Broussard 22	84	5539
Chambers County—		
Geo. Anderson, Lawrence 1, n of Cedar Point, W. D. Smith sur	*	7215
Brazoria County—		
McDannald, Hatfield 1, Pearland area, R. B. Lyle sur	*	7700
Titantic Oil Co., Poole 1, Allen area, T. W. Allen sur	*	4396
Matagorda County—		
Marrs McLean, Gulf-Tex 2, Big Hill area	*	3891
Tyler County—		
Davis & Co., Texas Long Leaf Lbr. Co. 1, A. Henry sur	*	2512

West Virginia

Company, Well and Location	Init Prod. Bbls.	Depth
Boone County—		
Owens-Libby-Owens, Roberts 6	*	4275
Calhoun County—		
W. H. Bickel, Jackson 1	*	1789
Lincoln County—		
Harmon Gas Co., Lovejoy 1	¶.13	3781
Roane County—		
Rogers Properties Co., Moore Hrs. 2	8	1826
Wayne County—		
Grover Lowe et al, Luster 1	¶.20	3143

Wyoming

Company, Well and Location	Init Prod. Bbls.	Depth
Niobrara County (Lance Creek)—		
Argo Oil Corporation, Ford 8, cse ne nw 33-36n-65w	1680	5416

Texas A. & M. schedules meet on practical geophysics

A conference of special interest to petroleum engineers, geologists and practical oil men on "Practical Geophysics and Round Table Discussions" will be held at College Station, Texas, April 4 to 6, under direction of School of Engineering of A. & M. College of Texas.

The conference is primarily a series of lectures by Dr. Garrett Kemp, consulting engineer and special lecturer. The purpose is to bring together engineers and others who are interested in a conference on practical geophysics. The three-day session will cover the full range of geophysical methods. Full particulars may be obtained by writing the School of Engineering, Department of Petroleum Engineering.

Oklahoma Pipe Line takes up Bowlegs system

Oklahoma Pipe Line Company is taking up its gathering system in Bowlegs field, Oklahoma, consisting of approximately 15 miles of 4-, 6-, 8- and 10-inch lines. Recovered pipe will be reconditioned for future use. The pumping station in this area has been abandoned.

WILDCAT REPORT
New Starts and Completions

ARKANSAS
FIRST REPORT

Arkansas County—Fohs Oil Co., Miller 1, sec 33-5s-4w, spudded (4500 ft test).

CALIFORNIA
FIRST REPORT

Kern County—Richfield Oil, Wheeler-Ridge-KCL 2, lcn 2026 ft s, 70 ft e center Section 28-11-20, Wheeler Ridge area.

KANSAS
FIRST REPORTS

Cowley County—C. L. Carlock et al's Key 1, csl se se 21-30-7e, ru mch.

Marshall County—Frankford Drilling Co.'s Shearer 1, nwc 29-4s-9e, otd 822 ft, to deepen.

COMPLETIONS

Butler County—Rex & Morris' Wright 1-A, c n½ lot 16, 30-28-8e, 2 mi w Ferrell Pool, top Mississippi 2778 ft, td 2865 ft, abnd.

Gove County—Cities Service Oil Co.'s Victory 1, cwl nw 36-13s-10w, 6 mi sw Gove, top Misener 4412 ft, top Viola 4564 ft, top Arbuckle 4615 ft, top Pre-Cambrian 5161-91 ft, td 5191 ft, no shows, abnd.

Johnson County—Thurow et al's Green 1, c sw 25-14-22e, near Gardner pool, top Arbuckle 1654 ft, sso 1666-67 ft, td 1698 ft, abnd.

Rice County—Mid-Plains Oil Co.'s Newkirk 1, c s½ sw se 14-18-7w, 3 mi e Galt pool, top Simpson 3410 ft, top Arbuckle 3482 ft, td 3486 ft. water, abnd. Pryor and Lockhart's Souther 1, c n½ ne ne 14-19-10w, 1 mi e Brandenstein pool, top Arbuckle 3284 ft, sso 3286-89 ft, hfw, td 3325 ft, abnd.

Stafford County—A. M. Landon & Atlantic Ref. Co.'s Coen 1, nwc ne 15-23-14w, 8 mi nw St. John pool, top Ft. Riley 2020 ft, top Florence 2130 ft, top Wreford 2220 ft, top Topeka 3095 ft, top Lansing 3545 ft, top Marmaton 3765 ft, top Viola, top Simpson 3943 ft, top Arbuckle 3985 ft, td 4003 ft, no shows, abnd.

SOUTH LOUISIANA
FIRST REPORTS

Iberville Parish—Shell's Southwood Riverside Plantation 1, 2000 ft e along the s line of sec from swc of sec 20-9s-2e, thence 115 ft n to lcn.

St. James Parish—St. James Oil Co.'s Celestine Plantation 1, n of Convent, 7500 ft n and 6000 ft e of Mississippi river, sec 74-11s-4e, lcn.

Vermilion Parish—G. H. Vaughn's Avery Boullion 1, Erath area, center of a 20-ac tract of 40-ac tract, sec 49-3s-4e, lcn.

COMPLETION

St. Martin Parish—Wm. Helis' Rycade Oil Co. 1, sec 28, sec 33-9s-7e, abnd 9411 ft.

NORTH LOUISIANA
FIRST REPORT

Catahoula Parish—Continental, Tensas Delta 1, sw sw 12-9n-7e, materials.

MICHIGAN
FIRST REPORTS

Allegan County—Q. Devrie's Atwater 1, se ne nw 9-2n-16w, rig. Twin Drilling Company's Minar 1, se se sw 15-1n-11w, dr. Hugh H. Heinigs' Mixluschek 1, nw ne ne 9-3n-11w, dr.

Barry County—Dr. S. J. Higelmire's Schiefla 1, nw nw nw 6-4n-10w, dr.

Kalamazoo County—R. D. Malcolm's Kinney 1, se se sw 5-4s-12w, lcn.

Monroe County — Berell Oil Corporation's Yape 1, sw se nw 7-7s-6e, rig.

Shiawassee County — Try-More Oil Company's Shimunec 1, nw nw se 5-7n-2e, dr. Miller & O'Neals' Rowley 1, ne ne sw 11-6n-3e, lcn.

COMPLETIONS

Kent County — North American Drilling Company's Lamoreius 1, sw sw nw 28-8n-10w, Traverse 2242 ft, td 2258 ft, abnd.

Ottawa County—Weller & Dapars' Powers 1, sw ne nw 28-8n-13w, Traverse 1915 ft, td 1922 ft, abnd.

Van Buren County—William Frude's Allen 1, ne nw ee 28-1s-15w, Traverse 1168 ft, td 1181 ft, abnd.

MISSISSIPPI
FIRST REPORTS

Copiah County—Sid Wheless, Fee 1, ne ne 19-1n-3w, moving in materials.

Madison County—E. L. Foster, Haffey 1, nec s½ lot 5, 8-10n-5e, dk. (5000 ft test).

Wayne County—Hill & Hill, Fee 1, c sw ne 5-9n-7w, rig up. (6500 ft test).

NEBRASKA
COMPLETIONS

Richardson County—Pawnee Royalty Co.'s Myers 1, c nw nw 24-1n-15e, near Fall City, top Mississippi, below 50 ft, top Hunton 2520 ft, hfw 2550-75 ft, Viola 3183-86 ft, so 3183-86 ft, 34 gr., water 3235-40 ft, top Arbuckle 3580 ft, salt water in Wilcox and Arbuckle, td 3710 ft in Arbuckle, abnd. E. V. Jackson et al's Hill 1, c nw sw 32-2n-16e, n of Fall City, abnd lcn.

NEW MEXICO
FIRST REPORT

Eddy County—J. B. Cowden et al's State 1, c sw se 3-17s-29e, spudded.

OKLAHOMA
FIRST REPORTS

Garfield County—Magnolia Pet. Co.'s Kring 1, c se sw 12-21n-3w, dr.

Garvin County—Sanders' Buckner 1, nwc sw 27-1n-2w, dr. Roy Starr O&G Co.'s Skil 1, nwc ne 8-4n-3e, lcn.

Hughes County—Walker & Johnson's Rogers 2, nec 24-7n-9e, lcn. Boydston's Rebstein 1, c nw se 11-6n-9e, sd 175 ft.

Kiowa County—Henry et al's Huff 1, swc nw 32-7n-18w, dr.

Lincoln County—Jones Associated Oil Co.'s Warren 1, nwc sw 28-15n-5e, mim. Sand Springs Home's Cook 1-A, nw sw ne 28-17n-6e, pits.

Payne County—Texas Co.'s Burroughs 1, c e½ ne nw 11-17n-1e, dr. Kemp et al's Meyer 1-A, nw se se 17-17n-6e, rust.

Seminole County—Patterson et al's Thlocco 1, se sw nw 30-7n-7e, lcn.

COMPLETIONS

Hughes County—Walker & Johnson's Rogers 1, nec 24-7n-9e, 6 mi e Holdenville, td 635 ft abnd.

Lincoln County—Harper & Turner's Mann 1, nwc se 23-14n-5e, 2½ mi s Davenport field, top Bartlesville 3937 ft, td 4105 ft, no shows, abnd.

TEXAS GULF COAST
FIRST REPORTS

Harris County—Carlton et al's Bender Estate 1, e side of Humble, 2066 ft s from nec of sur, thence 466 ft w at right angles in J. W. Singleton sur, lcn. Rowan & Nichols' Lobit 1, Cedar Bayou area, 489 ft fr n and s line of block 8, B. Barrow sur, lcn.

COMPLETIONS

Chambers County—Geo. Anderson's Lawrence 1, n of Cedar Point, 2970 ft fr bayshore and 165 ft w of L. A. Lawrence 300-ac tract, W. D. Smith sur, abnd 7215 ft.

Brazoria County—McDannald's Hatfield 1, Pearland area, 488 ft fr w line and 363 ft fr n line of 15-ac tract, R. B. Lyle sur, abnd 7700 ft. Titantic's Poole 1, Allen dome area, 55 ft fr s and 1187 ft fr e line of 285.75-ac tract, T. W. Alley sur, abnd 4396 ft.

Matagorda County—Marrs McLean's Gulf-Tex 2, Big Hill area, abnd 3891 ft.

Tyler County—Davis & Co.'s Texas Long Leaf Lbr. Co. 1, 467 ft fr s and e lines of lease, A. Henry sur, abnd 2512 ft.

SOUTH TEXAS
FIRST REPORTS

Duval County—C. Andrade III's John Miller 1, 467 ft n and e lines, nw¼ sec 62, Copita Farm and Garden subd, Hinojosa gr, 3 mi w of Sejita, prep to run 500-ft sur cas. W. H. Holland's Ira G. Yates Est. 1, 466 ft n and e lines s½ SA&MG sur, 1, 7 mi nw Fitzsimmons pool.

Guadalupe County—E. Eickenroght et al's Wm. Olkers 1, 270 ft s line and 425 ft e line, sec 206, Esnaurizar sur, 3 mi sw Geronimo, dr 465 ft.

Jim Hogg County—V. G. Schimmel's Carlos Palacios 1, 120 ft n line, 700 ft w line, blk 14, Montgomery sur 230, 3 mi sw Randado, dk.

San Patricio County—Seaboard Oil Corp.'s W. E. Lovett 1, 1320 ft s and w lines, 160-ac lse, sec 131, midway between two producers in E. Mathis field, prep to mi.

Williamson County—B. C. Lanier's Guentuel 1, 6700 ft sw and se lines, Henry Cook sur, extreme e corner of county, loc. Taylor Refining Co.'s Hurta 2, 1350 ft nw line, 467 ft sw line, Coursey sur, 1½ mi se Taylor, dr 980 ft.

Zavalla County—H. F. Wilcox O&G Co.'s A. A. Storey 2, 467 ft n and w lines, sec 19, G. W. T. & B. sur, 2 mi ne of No. 1, set sur csg, woc.

COMPLETIONS

Bexar County—Philtop O&G Co.'s W. R. Patton 2-A, 1600 ac tr, Rodriguez gr, 300 ft nw No. 1-A, 1 mi w Mitchell Lake, 8 mi s San Antonio, abnd 1946 ft, dst 1840-1946 rec sul w.

Duval County—G. W. Basom's Henry Adami 1, 220 ft n line, 1600 ft e line, 206.82-ac tr, sur No. 341, 2000 ft w line, 1490 ft s line of sur, 3 mi sw Adami field, 20 mi nw Freer, abnd 1291 ft.

Guadalupe County — Clayton E. Eaton's Pauline Volkman 1, 234 ft n line, 468 ft w line, 130 ac tr, J. C. Wilson sur, 1½ mi e of Elm Creek field, abnd 1925 ft. Wellington Oil Co.'s R. L. Beaty 1, 1320 ft n and e lines, H&EC sur No. 10, 12 mi se of Seguin, abnd 3870 ft.

Jim Hogg County—Humble's Mestina O&G Co. 3 (5), 11,350 ft w line, 8300 ft n line, Baluarte gr, 10 mi se of Hebbronville, abnd 6383 ft.

Jim Wells County—Henshaw Brother's W. E. Gaither 1, 466 ft fr n line of s 127 ac tr of 328 ac tr, 466 ft w line of Anita gr, 1 mi s of Al Smith, abnd 5769 ft. Reese & Dunn et al's Perez 1, 466 ft s and w lines, lot 13, sec 6, Cushing subd, Loral gr, 41.07 ac tr, 2 mi nw of Alice on Ark. Fuel farmout, abnd 5510 ft, swabd dry thru cas, perf 3350-60 ft.

Live Oak County — Harry Hotchkin's So. Tex. Nat'l Bank 1, fr se cor Anderson 163-ac tr 286 ft n, 467 ft e at rt/a to loc in F. M. Adams sur, No. 10, 3 mi ne of Three Rivers, abnd 2161 ft.

McMullen County—Gorman & Yoakam's N. L. & L. S. Co. 1, 467 ft fr nw and sw lines, 80-ac lse, I&GN RR sur No. 1, 990 ft nw line of sur, abnd 1768 ft.

Starr County—Syndicate Oil Corp.'s Sanchez 1, 220 ft fr s and w lines, 60 acres of n 120 acres of sur 344, 12 mi n of Las Saenz, abnd 988 ft. Zimmerman's Ben D. Wood 1, 600 ft n line, 900 ft w line of 120-ac lse in c 3/7 of

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Victoria County—Colton & Colton's C. C. Buchholz 1, begin s cor of blk 26, go 466 ft sw along se line of blk 26 extended to loc in blk 27, 2000 ft nw line, 466 ft ne line, Gonzales Hidalgo sur, ab 61, 2 mi s of Cologne field, abnd 5400 ft, tested sw in shallow sands.

EAST TEXAS

FIRST REPORT

Freestone County—C. F. W. Young et al's Roy Simmons 1, 693 ft from e and 2335 ft from s lines 376-acre tract, M. DeCantona sur, 1½ mi w Simmsboro, lcn.

COMPLETIONS

Limestone County—Zephyr Oil Co.'s Carrie Peeples 3, 4500 ft from n and 2500 ft from e lines of R. Scott sur, 700 ft s Peeples 2, elev 510 ft, abnd 2868 ft.

Red River County—Kansas-Oklahoma Pet. Corp.'s R. H. Ringwald 1, 150 ft out of swc of 56-acre tr, A. Moore sur, 1 mi nw Manchester, elev 459 ft, abnd 955 ft.

WEST TEXAS

FIRST REPORT

Crockett County — Spears et al's A. C. Hoover 1, c sw nw GC&SF sec 10, blk 1, lcn for 2500 ft test.

COMPLETIONS

Fisher County—Montour Production Co.'s Ivy Taggart-Tidal 1, c ne sw H&TC sec 184, blk 2, elev 1912 ft, trace gas 3770-80 ft; 5215-20 ft and 5223-24 ft, abnd in black shale 5664 ft.

Lynn County—H. F. Wilcox O&G Co.'s E. L. Powell 1, nw sw sw E. L. Ry. sec 134, blk 12, elev 3280 ft, top anhydrite 2140 ft, top Yates 2750 ft, top brown lime 3670 ft, top solid lime 4170 ft, abnd 5182 ft.

Pecos County—H. L. Cain et al's Lehman-Cities Service 1, 2310 ft from s and 990 ft from w lines H&GN sec 107, blk 8, elev 2484 ft, top brown lime 1410 ft, top Yates 1505 ft, abnd in sul w 1685-86 ft, R. E. Clawson et al's Lehman-Cities Service 1, 2750 ft from s and 770 ft from w lines H&GN sec 107, blk 8, missed shallow pay, abnd 53 ft.

WEST CENTRAL TEXAS

FIRST REPORTS

Brown County—M. R. Stuard et al's E. Hennigan 1, 470 ft from s and 1320 ft from w lines nw¼ MEP&P Ry sec 1, spd.

Coryell County—Kistler O. & G. Co.'s Barnes 1, 360 ft from se and 3700 ft from ne lines of H. Farley sur, 3 mi ne Gatesville, sd for cas 585 ft.

Jones County—Lewis Production Co.'s M. T. & H. H. Ramsey 1, 467 ft out of nec T&P sec 80, blk 14, mim for 2000-ft test.

COMPLETIONS

Brown County—H. P. Evans et al's Evans 1, J. P. Woodward sur No. 620, abnd 700 ft.

Callahan County — J. E. Hunter & H. L. Graham's K. B. Leggett 1, 2020 ft from s and 1650 ft from e lines sec 7, blk 8, S. P. Ry. sur, abnd 1835 ft.

Coryell County—T. D. Wallace et al's M. Murray 1, 6000 ft from se and 3800 ft from sw lines of H. Farley sur, abnd 612 ft.

NORTH TEXAS

FIRST REPORTS

Clay County—Orien N. Childs et al's W. C. Heard 1, 1350 ft from n and 908 ft from e lines of Pat Osborne sur A-369, 2 mi ne Dean, sp. Gorman Dri. Co.'s C. T. Taylor 1, 650 ft from s and 264 ft from e lines blk 55, Bacon subdivision, 3½ mi w Petrolia, lcn. Gorman & Ted Norwood's Cheeves-Turner Oil Co. 1, 780 ft from n and 978 ft from e lines blk 54, Bacon subdivision, dr 550 ft; C. T. Taylor 1, 1148 ft from nw and 1191 ft from ne lines blk 38, Bacon subdivision, lcn, W. B. Hamilton et al's W. M. McGregor 1, 150 ft out of nwc blk 52, Specht-McCutcheon sur, ½ mi s Thornberry, sp. J. S. Staley Jr. et al's N. C. Phariss 1, 300 ft from s and 1060 ft from e lines blk 49, Spect-McCutcheon sur, dr 850 ft.

Wilbarger County — Amerada Pet. Corp.'s B. Goodpasture 1, c sw sw H&TC sec 35, blk 15, 2 mi nw Fargo, mim for Ordovician test.

Young County—T. C. Hadley et al's W. W. Farmer 1, 150 ft out of nwc of R. G. Jones sur A-1469, 1 mi n Farmer, lcn, E. D. Willis et al's T. J. Routon 1, 150 ft from s and 750 ft from w lines sec 265, TE&L Co. sur, 1¼ mi se Orth, lcn.

COMPLETIONS

Archer County—C. W. Clark et al's D. D. Strange (60-acres) 1, 150 ft out of sec sec 31, blk 5, Clark-Plumb sur, trace oil 1124-37 ft, abnd 1154 ft. Jim Fish et al's A. B. Claggett 1, 850 ft from n and 150 ft from w lines of R. Storey sur A-373, trace oil 1163-65 ft, abnd 1216 ft.

Clay County—L. T. Burns et al's W. R. Lyon 1, 150 ft out of sec n½ blk 89, Byers Bros. subdiv, abnd 1436 ft. J. G. Mullens 1, 330 ft out of sec n-160-acres sec 2617, TE&L Co. sur, trace oil show 3243-85 ft, no shows in lower Strawn, abnd 3655 ft. Dresser et al's E. H. McClellan 1, 1751 ft from n and 1551 ft from e line (river) of C. F. Stanley sur A-407, abnd 1350 ft.

Jack County—Paul Steed & Joe Cooper's W. J. Mathis 1, 600 ft from n and 1325 ft from w lines of J. H. Nessmith sur A-1562, Strawn saturation 2876-84 ft, pumped 251 bbls. initial.

Wichita County—Perry Browning et al's Hoge et al 1, 750 ft out of nwc blk 33, KWVFL sur, abnd 900 ft.

Wilbarger County—H. G. Gay et al's A. S. Ross 1, 660 ft from s and 1320 ft from e lines H&TC sec 65, blk 15, abnd 2501 ft.

Young County—Ed Fulton et al's I. W. Clifton 1, 150 ft out of nwc e½ sec 92, TE&L Co. sur, Gunsight lime 1088-92 ft, abnd 1223 ft.

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Diesel Electric Sets

CATERPILLAR TRACTOR COMPANY

Two additions to its line of Diesel electric sets have been announced by Caterpillar Tractor Company, Peoria, Illinois. The units, of 52-kilowatt and 66-kilowatt capacities, are completely self-contained and require no accessories other than a circuit breaker. They are powered by 6-cylinder, heavy-duty Diesel engines and, according to the manufacturer, can be set up and running within an hour after delivery.

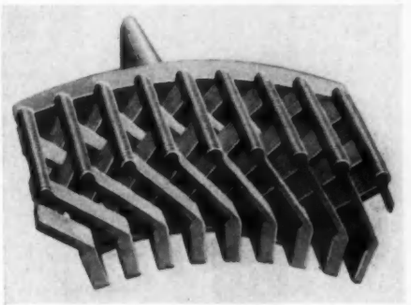
The company's line now includes 5 Diesel electric sets, former models being of 15-, 20- and 30-kilowatt capacities.

Valv-Amp Rotor

GENERAL ELECTRIC COMPANY

A new-type rotor has been announced by General Electric Company, Schenectady, New York. It is described as offering the advantage of longer life with less maintenance by making possible use of cast-aluminum rotors in the larger sizes of double-squirrel-cage motors for high-starting-torque, low-starting-current service.

Called the Valv-amp rotor, it makes use of a unique shape of rotor slot and



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Lubricator

SWIFT LUBRICATOR COMPANY

An improved lubricator for steam-driven pumps, engines, hoists, hammers, flue cleaners or internal oiling wherever steam is used has been announced by Swift Lubricator Company, Elmira, New York. It is available in single and double connection styles, and in ¼, ⅓, ½ and 1 pint, and 1 quart sizes.

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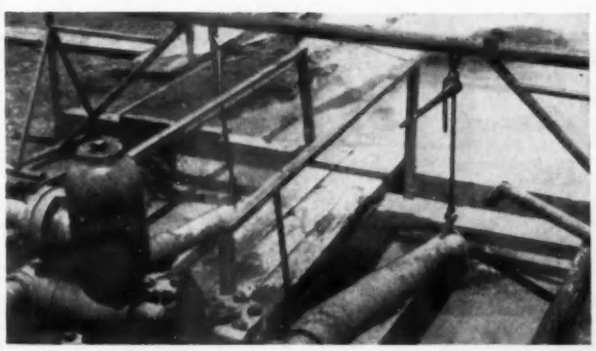

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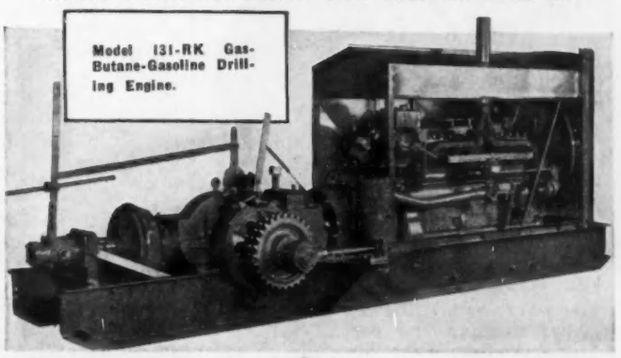

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Swift Lubricator

are packed with a special Garlock solid-ring packing made especially for the lubricator. Castings are made from a nickel-bronze composition to withstand heavy working pressure. Knurled composition handles have replaced the wooden valve wheels used on the old model, ending possibility of handles drying up from heat of the steam and cracking off. The knurl enables perfect grip and operation even with oily hands.

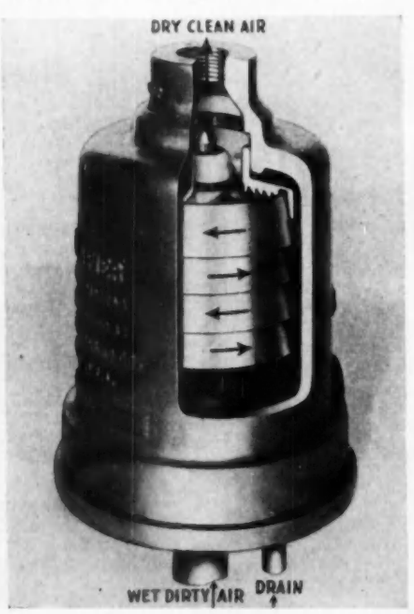
Improved parts are made to interchange with the company's lubricators now in service.

Aridifiers

LOGAN ENGINEERING COMPANY

Logan Engineering Company, 4912 Lawrence Avenue, Chicago, has a line of aridifiers for removing moisture and oil from air and gas lines in sizes from ⅜-inch to 10-inches. They remove dirt, scale, oil and moisture on a multiplicity of propeller blades which revolve in opposite directions and are propelled by the flow of air or gas. The arrested contamination and moisture are collected in the lower housing from which they are drawn off as occasion warrants.

The units are designed for application to gas lines, compressed gas lines, or air driven or actuated operated equipment in field or refinery.



Logan Aridifier

Chains

American Chain & Cable Company, Inc., Bridgeport, Connecticut, has published a new edition of its Catalog No. 365 on welded chains. The revised edition includes a 2-color, 16-page insert devoted to Acco Registered Sling Chains and covering Endweldur Chains —late developments in the welded chain line. Iron crane chain, in both H. B. and Ajax grades, is also included.

Large illustrations and accompanying descriptions facilitate selection of the proper chain for a particular use. Necessary attachments such as hooks, cold shuts and shackles are also illustrated and described.

ECOLITE MODEL 72

GIVES YOU 1500 FOOT POWER BEAM

THANKS TO DIE CAST REFLECTOR

Here's the most powerful focusing spotlight ever built in an Electric portable lantern. Also "top light" to give you a broad, brilliant floodlight. Safe anywhere. Approved by Underwriters' Laboratories.

AVAILABLE NOW AT SUPPLY STORES

ECONOMY ELECTRIC LANTERN CO.
3100 W. CHERRY ST. MILWAUKEE, WIS.
Pacific Coast Office:
1406 S. Grand Ave., Los Angeles, Cal.

ECOLITE
IT PIVOTS—TILTS—FOCUSES

Standco
NO-SMOKE
STANDCO BRAKE LINING

Is the driller's best friend because it makes the easiest brake known and "feeds off" evenly while drilling. It never scores brake rims. See Page 2100 Composite Catalog.

Standco Brake Lining Co.
HOUSTON

NOTES FOR THE Equipment Buyer and User

Dow Chemical Co. Announces New Plant for Freeport, Texas

Dow Chemical Company has awarded contract to The Austin Company for a new plant to be constructed at Freeport, Texas. Work on the project, for which an 800-acre tract has been acquired, will start in late April or early May. When completed, the plant will give employment to around 750 persons.

The company, through its subsidiary, Dowell Incorporated supplies the petroleum industry with services on acid treatment, carbonate mud removal, lime scale removal and loosening stuck drill pipe, and manufacturers paraffin solvents, chemical formation plugs, mud solvents, magnesium metal liners and casings and other products. Dowell Incorporated also furnishes a complete line of chemicals for petroleum refining, and supplies much of the ethylene bromide used by Ethyl Gasoline Corporation in the manufacture of anti-knock fluid.

Dow Chemical Company manufactures some 350 kinds of chemicals, including pharmaceutical in addition to industrial items. Its main plant is at Midland, Michigan, and additional plants are located at Marquette, Michigan; Venice, Pittsburg and Long Beach, California, and Wilmington, North Carolina.

Dowell Incorporated has a division office at Houston with S. C. Morian in charge as division engineer and C. T. Young as district manager.

Hewitt Appoints Moffatt New York District Manager

Hewitt Rubber Corporation, Buffalo, New York, has announced appointment of Benjamin T. Moffatt as manager of its New York district. He is widely known in the New York area and brings to Hewitt customers a background of many years experience in the mechanical rubber goods industry.

Chester Sappington Joins General Geophysical Company

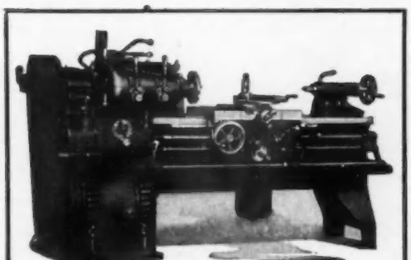
Chester Sappington has joined the staff of General Geophysical Company as vice president in charge of field work. Upon graduation from the University of Oklahoma in 1928 with a B.S. degree in geological engineering, he became connected with an oil company as scout, and later did considerable geological work for the company. He resigned in 1932 to become associated with a Texas geophysical company and served in field work in the Gulf Coast, Mississippi, Louisiana and West Texas areas. He was field supervisor for the company at the time of his resignation to become associated with General Geophysical Company.

Sappington will make his headquar-

CHESTER SAPPINGTON
Vice President General Geophysical Company

STOPPERS FOR OIL LINES

Send for catalogue
SAFETY GAS MAIN STOPPER CO.
523 Atlantic Ave. Brooklyn, N. Y.



The Boye & Emmes Timken Bearing Engine Lathe

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Electric Arc Spot and Butt Welders—Hand Power and Electric Traveling Cranes—Foundry and Forge Shop Equipment.

C. J. HARTER, Machinery
4000 Clay, Houston, Texas
Fairfax 1466

GET ACCURATE RESULTS
Quickly . . Easily . . with
CURTIN CENTRIFUGES

No. 3480...100 c.c. machine. Cranks and heads interchangeable with 15 c.c. machines.

You can maintain your required speed for the period of the test with much less effort. Curtin Centrifuges, proven world-wide, are heavy duty, rigidly constructed, and extremely simple in design. Illustrated bulletin, giving full details, available upon request.

W·H·CURTIN & CO. Inc.
HOUSTON U·S·A TEXAS

LINE SCALES
For Every Need!

Packer Junior, 6" dial, net Wt. 19 lbs., 40,000 to 75,000 lbs. cap.
Packer Special, 8" dial, net Wt. 29 lbs., 100,000 lbs. cap.
Conrad, 12" dial, net Wt. 80 lbs., 180,000 lbs. cap.
Regular Driller, 12" dial, net Wt. 85 lbs., 360,000 lbs. cap.
Regular Driller with recorder, net Wt. 100 lbs., 360,000 lbs. cap.
Regular Driller, 14" dial, net Wt. 88 lbs., 360,000 lbs. cap.
Super, 14" dial, net Wt. 91 lbs., 500,000 lbs. cap.

Line Scale Co. Inc
OKLAHOMA CITY, OKLA.
907-11 SE 29th Phone 2-1765 P. O. Box 4139
EXPORT REPRESENTATIVE
30 Rockefeller Plaza, New York, N. Y.

MERLA

NEW! Improved Hookwall Packer

Insert Pump
Anchors
Packers
Flow Valves
Swabs

It's got what you want in a packer . . . real Packer Performance! The new MERLA Packers meet the insistent demand for rugged, efficient and reliable equipment for deeper and deeper wells. Just note these new and added MERLA features: Positive non-leaking valve on valve in head type . . . special reinforced packing sleeve . . . Five slips for balanced pressure distribution against the casing . . . Slips are dovetailed to the cone . . . slips and packing sleeve assembly free swiveling in cage . . . no rivets or welding on the slips or slip reins . . . friction springs are hinged to the cage . . . rugged all steel construction with the exception of malleable cage. You may order these packers with valve or without valve, as desired. Profit by writing us about your production problems.

Send for your copy of the Merla Descriptive Catalog

See Pages 1642-1643 Composite Catalog

MERLA TOOL CORPORATION
Manufacturers of Oil Field Equipment
P. O. Box 2576 Dallas, Texas
Oil Field Engineering Sales Co. 710 Garfield Alhambra, Calif. — Service in all Principal Mid-Continent Oil Fields

NOTES FOR THE Equipment Buyer and User

ters in the Houston office of General Geophysical Company in the Gulf Building.

Supply Personals

The Timken Roller Bearing Company today announced the appointment of Robert S. Crawford as superintendent of rolls. He will assist Gene Ball, superintendent of rolling mills.

Richard C. Marr, service engineer for Baroid Sales Division, has been transferred from the Tulsa office to the Gulf Coast area, with headquarters at Houston.

F. M. Wittlinger, of Texas Electric Steel Casting Company, has returned to Houston from an extended tour through the North and East where he investigated new developments in the steel industry.

John Stilwell, Consolidated Edison Company, New York, will be the principal speaker at the International Petroleum Exposition safety banquet in Tulsa on May 23. Henry W. Boggess, Sinclair Prairie Oil Company, is chairman of the safety committee.

Valves

A new catalog has been issued by the Consolidated Safety Valve Division of Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut, listing oil and gas relief valves and containing detailed pages of capacity tables, overpressure factor curves and valve selection data.

Several pages have been devoted to steel pipe flanges and flanged fittings ASA B16e-1939, as published under the heading of American standard for steel pipe flanges by the American Society of Mechanical Engineers. The new catalog is designated No. 1600.

Distillate Engineering Organized To License Distillate Recovery

Distillate Engineering & Processing Company has been organized to license distillate recovery processes developed by Stanolind Oil & Gas Company, Eureka Process Corporation, Standard Oil Development Company of New Jersey, Tide Water Associated Oil Company and Seaboard Oil Company of Delaware.

Officers of the company are Hugh Ownby, president; Emby Kaye, vice president and general manager, and Paul F. Hawley, secretary. Offices have been established in the National Bank of Commerce Building, Tulsa.

J. B. Templeton Named Head of Templeton, Kenly & Company

J. B. Templeton, former vice president of Templeton, Kenly & Company, Chicago, manufacturers of Simplex jacks and equipment, has been elected president of the organization, succeeding W. B. Templeton, who is now chairman of the board.

J. B. Templeton has been associated with the organization since 1928, at which time he started in the company's shops. Working in different phases of production, wherever an opportunity presented itself, he eventually transferred to the clerical end of the business. Subsequently, he entered the sales department and worked in various sections of the country where he became familiar with problems of users of jacks. He finally acceded to management of the New York office where

J. B. TEMPLETON
President, Templeton, Kenly & Company

3-Point PROTECTION AGAINST DAMAGED THREADS

The next time you order pipe, be sure the threads are properly protected while in transit . . . specify X-L "All-Thred" Thread Protectors. Leading operators everywhere prefer them because of their scientific construction . . . Write factory at Wheeling for your complete FREE Catalog.

Warehoused by
HENRY H. PARIS, 1121 Rothwell St., Houston
JAMES RIORDEN CO.—Los Angeles, San Francisco

WHEELING MACHINE PRODUCTS COMPANY
WHEELING WEST VIRGINIA

Alten's

SWING CHECK VALVES

A Check Valve is no better than its "intestinal fortitude." All internal working parts of ALTEN'S CHECK VALVES are made of bronze. That's why they stand the gaff. Specify them the next time.

ALTEN'S FOUNDRY & MACHINE WORKS

Established in 1889

LANCASTER, OHIO, U.S.A.

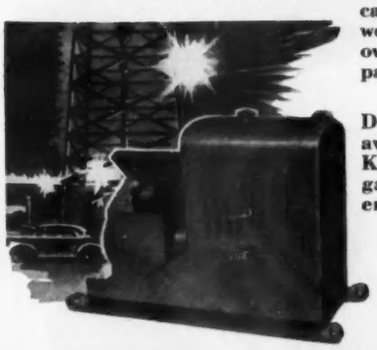
BRANCH WAREHOUSE: 2120 Rothwell St., Houston, Texas

LIGHT AND POWER by NOVO

NOVO GENERATING SETS give a smooth flow of dependable power for rig lighting and power for electric tools. Rugged, continuous-duty, oil field engines power these sets, assuring unfailing night and day operation.

These oil field generating sets are compact, close-coupled outfits with steel skids with end loops for easy portability. Can also be furnished on two- or four-wheel trucks.

Sets can be furnished with combination gas-gasoline carburetor and with a weather-proof cover over the instrument panel.



DC and AC sets are available from 1½ KW to 10 KW with gasoline and Diesel engine power.

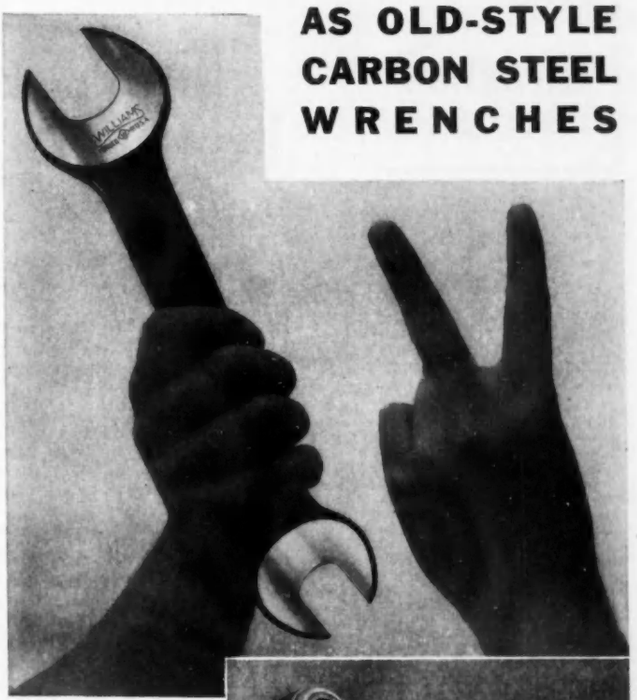
Sales and Service by

THE NATIONAL SUPPLY CO.

NOVO ENGINE COMPANY
LANSING, MICHIGAN

TWICE AS STRONG

AS OLD-STYLE CARBON STEEL WRENCHES



In Williams "Superior" Wrenches you get just about twice the strength of old-fashioned carbon wrenches. These Improved tools are forged from specially-processed carbon steel and average 93% as strong as the finest corresponding alloy wrenches which sell for nearly double the price. Supplied in 50 patterns—more than 1,000 standard sizes.

And in addition to Open-End types, Williams manufacture the most complete line of wrenches in the world including Adjustable, Box, Reversible Ratchet, Socket, and Detachable Socket types. If you want the most for your wrench dollar—standardize on Williams. Write for free literature, or see our advertisement in the Composite Catalog. Buy from your Supply Store.

J. H. WILLIAMS & CO., 225 Lafayette St., NEW YORK, N. Y.

The Hall Spiral Casing Guide DOES 4 IMPORTANT JOBS AT ONCE!

Spiral spring blades on the Improved Hall Casing Guide contact the entire mud column and the **complete circumference** of the wall . . .

(Patents Pending)

1 **Trowels the wall of the hole,** removing superfluous mud and delivering the weight back to the mud column. Enlarges the hole again to maximum size, allowing the gas to remain in a short horizontal space between casing and hole wall, rather than channeling vertically up the hole. Delivers the circulation back to the bore of the well, allowing the capillary action of the water supported by the mud column pressure to keep the gas pressure beyond the bore of the well—thus helping tremendously in preventing blowouts.

2 **Breaks viscosity** in complete mud column, eliminating channeling.

3 **Centers casing shoe** when passing obstructions, caves, whipstocks, casing windows, etc.

4 **Centers casing string** to assure uniform cement flow.

RESULT—The Hall Casing Guide preconditions the walls . . . helps eliminate blowouts . . . and assures tighter, more uniform cement jobs.

EASY INSTALLATION

To install, slide spiral guide over the casing to desired position with keyed slot in down position. Clamp guide to casing with rope binder until guide has desired diameter. Weld keys to casing. Remove binder and the outside diameter of the spiral springs is then at set diameter. On streamline pipe, split spiral guide vertically with cutting torch, place around casing, and re-weld.

Order through any recognized supply house. If your supply house does not have our Spiral Guide in stock, phone or wire any of our offices, at our expense, and delivery will be made promptly.

PRICE LIST (Effective March 1, 1940)

Casing, Size	O.D. Guide Collars	No. Springs	Price Including Freight
4½"	5 11/16"	5	$45.50
5"	5 11/16"	5	46.00
5½"	6¼"	5	46.50
5¾"	6¾"	5	48.00
6"	6⅝"	6	48.50
6⅝"	7¼"	6	49.00
7"	7⅝"	6	49.50
7⅝"	8 11/16"	7	51.00
8⅝"	9 11/16"	8	52.50
9"	9⅝"	9	54.00
9⅝"	10 3/16"	9	55.50
10¾"	11 3/16"	10	57.00
11¾"	12 11/16"	11	58.00
13"	13⅝"	13	60.00
13⅜"	14 3/16"	13	61.50
16"	16 11/16"	16	65.00

Standard length of guides, 42". Standard spring bow, 5" beyond casing diameter. Spring width, 1½". Spring thickness, ⅛" and 3/16". 3/16" is recommended only in well orientation or where guide is run 1,000' or more above the shoe.

HOUSTON PIPE APPLIANCE CO.

Houston • 1601 Wesley St., Phone Wayside 4050
Tulsa • 310 Thompson Building
Los Angeles • P. O. Box 5842 Metropolitan Sta.
Telephone Hollywood 1792

NOTES FOR THE Equipment Buyer and User

he was in contact with export activities of the firm.

In 1935, so that W. B. Templeton, who founded the firm in 1899, might spend more time away from the plant, the younger Templeton assumed the duties of vice president and sales manager.

Hays Corporation Names Chapman As Representative in Cincinnati

The Hays Corporation, Michigan City, Indiana, manufacturers of combustion instruments and automatic combustion control devices, has announced appointment of Charles M. Chapman, Cincinnati, as their representative covering southern Ohio and contiguous territory in Kentucky and Indiana. Chapman has established headquarters in the Schmidt Building.

Cooper-Bessemer Names Arthur To Head New St. Louis Office

Cooper-Bessemer Corporation has announced establishment of a branch sales office in St. Louis to cover the larger part of Missouri, southern Illinois, northeastern Arkansas and Mississippi as far south as Greenville.

W. S. Arthur, who joins the company to manage sales engineering activities in districts served by the new office, entered the heavy machinery industry in 1916 with the Foos Engine Company, and was later in charge of the experimental department of that company. Late in 1918 he joined the Worthington Pump & Machinery Company in a sales capacity. In 1927, Arthur entered the pump business as president of the Ohio Pump & Supply Company. He resigned in 1931 to become affiliated with the Superior Engine Company, and in 1936 was made head of that company's Chicago offices, where he served until recently resigning to assume his new connection.

W. S. ARTHUR
Joins Cooper-Bessemer Corporation

Braden Dead

William R. Braden, 37, president of Braden Steel Corporation and vice president of Braden Winch Company, Tulsa, died March 7 at his home.

Braden was born in Sewickley, Pennsylvania, and came to Oklahoma in 1922, where his father, Glenn T. Braden, was already established in the oil and gas industry. Following his father's death in 1923, Braden came to Tulsa to become one of the trustees of the Braden Steel Corporation. In 1932 he became general manager of the properties and president of the corporation.

Granzille Oil Tool Company Established at Houston

Granzille Oil Tool Company has been organized to handle a number of oil field items patented by G. A. Humason. Headquarters have been established at 4704 Navigation Boulevard, Houston. Officers are Dr. D. M. Hes-

RECTORSEAL

is not a thread "dope"

It is an especially prepared material for the treatment of threads and gaskets against leaks, developed specifically for oil industry connections. It is entirely different from those compounds used to protect threads against rust . . . and is not intended to compete with them. RECTORSEAL not only lubricates the threaded joint when making up, but forms a leak-proof seal from then on. It likewise permits easy breakout because it does not "freeze" the joint. A free sample will quickly prove these claims. Write TODAY to Rector Well Equipment Co., Inc., Ft. Worth, Texas.

BROKEN MAINS

QUICKLY, ECONOMICALLY REPAIRED

DOUBLEX SIMPLEX SPLIT SLEEVES

During and following the recent record-breaking blizzard thousands of Doublex Simplex Split Sleeves were used to repair breaks in pipe lines caused by the extreme weather—an impressive example of why it pays to keep a supply of these popular sleeves always on hand for emergency use. For literature on this new, improved, lower-priced model, address Acipco office nearest you.

AMERICAN CAST IRON PIPE CO.

BIRMINGHAM, ALA.

Dallas Houston El Paso Pittsburgh Kansas City Chicago
Minneapolis New York City Cleveland Los Angeles San Francisco

CARLYLE "RATHOLE"

Formation Tester Packer Elements

1/3 Tapered Style 1

Full Tapered Style 3

Replacement Packer Elements are now available for ALL makes and ALL styles of Rat Hole Formation Testers.

Why risk delay by using distorted elements—or waste time and money making slip-shod replacements when you can get them, custom built for YOUR Tester?—and not ordinary Packer Elements, No Sir!

Carlyle Packer Elements are made from the finest vulcanized Rubber and Fabric discs. They're finished to a smooth cone shape, and precision tooled to insure accurate tapers for positive Rat Hole seating. A straight center hole (to size required) is maintained from top to bottom, and O.D.'s are machined to exact size (usually 1" smaller in diameter than Main Hole or casing I.D.) to allow for drilling fluid displacement as Tester is being lowered into main hole.

We can furnish replacement Packer Elements for any Tester, shipped the same day order is received. Just send us the make and style, or your own drawings for quotations.

Write today for full price list and special export discount.

Carlyle Packer Element on Formation Tester. 2/3 Tapered Style 2

CARLYLE RUBBER COMPANY, Inc.

62-64 PARK PLACE NEW YORK, N. Y.

Oil Field Rubber Specialties

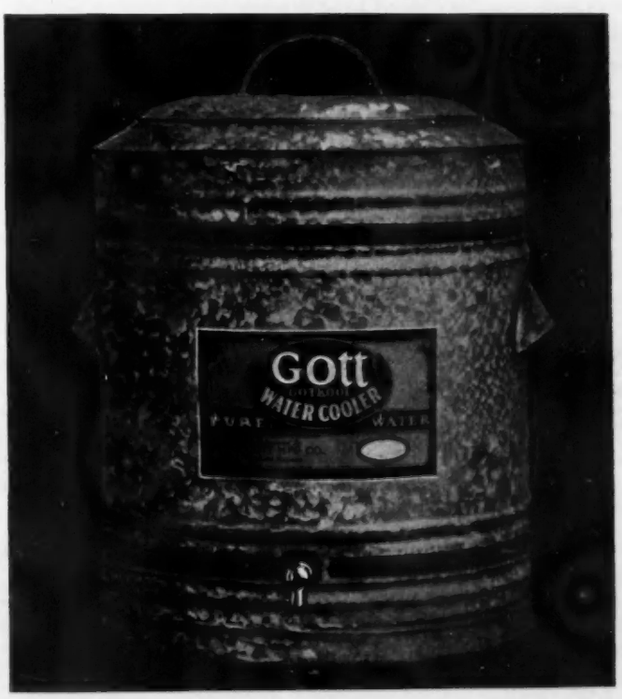
GOTKOOL WATER CANS
Come in 1½, 2 3, 5 and 10 gallon sizes

GOTKOOL WATER CANS AND COOLERS

Known throughout the Oil Industry, GOTKOOL Water Cans & Coolers are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting, easily removable tops. Extra large top on Water Cooler, also equipped with handy non-leaking faucet. Your Supply Store can supply you today.

H. P. GOTT MFG. CO., Winfield, Kansas

GOTKOOL WATER COOLERS
Come in 3, 5, 8, 10 and 20 gallon sizes



See Page 871 Composite Catalog

tand, president and treasurer; Humason, vice president and general manager, and Mrs. D. M. Hestand, secretary. J. A. Bolton is engineer.

The firm's line of products includes a device for separating oil and gas at the bottom of the well to control gas/oil ratio at this point, a drill-stem tester, and an attachment for cleaning oil well pumps without removing them from the hole. The latter may be installed on any make of traveling valve or pump and removes all mud, sand, shale or other foreign material, circulating it out of the hole.

Other Humason-patented products comprise the remainder of the firm's line of oil field equipment.

James D. Hughes Joins Universal Exploration Company

Universal Exploration Company, Houston, has announced addition of James D. Hughes to its staff as vice president. Hughes resigned as Gulf Coast division sales manager for Lane-Wells Company to accept his new position.

Gulf Supply Representative for Electric Hose & Rubber

Electric Hose & Rubber Company, Wilmington, Delaware, announces the appointment of Gulf Supply Company, 1209 Maury Street, Houston, as representative in the Gulf Coast territory. Gulf Supply Company will carry a complete stock of hose for the production, refinery and marketing divisions of the oil industry.

Electric Hose & Rubber Company are originators of many types of hose now used throughout the oil country. Newest development is Neoprene covered, braided, steam hose with static wire built in.

JAMES D. HUGHES
Joins Universal Exploration Company

HAROLD G. SMITH

Harold G. Smith has been appointed chief engineer of the engine division of the Buda Company, Harvey, Illinois, according to R. K. Mangan, vice-president. Smith has for several years been associated with the internal combustion engine industry.

It's a Fact — Johnston

OIL WELL TUBING WHEN FIRST USED IN AMERICA ABOUT 1808, WAS MADE OF WOOD! TWO BROTHERS DRILLING A WELL NEAR CHARLESTON, VIRGINIA, WANTED TO SHUT OFF WATER FROM THE PRODUCING ZONE OF THE WELL IN ORDER TO PUMP THE STRONG BRINE AND OIL FROM THE BOTTOM ZONE. NO PIPE WAS AVAILABLE, SO THEY WHITTLED TWO HALF-TUBES OUT OF WOOD, CAREFULLY FASTENED THEM TOGETHER WITH TWINE AND WRAPPED THE LOWER END WITH CLOTH TO MAKE IT AS "WATERPROOF" AS POSSIBLE. WHEN RUN IN THE WELL, THIS WOODEN STRING OF TUBING SUITED THE PURPOSE EXACTLY, AND THE FIRST "CONTROLLED PRODUCTION" OF FLUID FROM A WELL BECAME A REALITY.

TODAY, OPERATORS KNOW THE FINE POINTS OF CONTROLLED PRODUCTION – BECAUSE THEY START EARLY IN THE LIFE OF THE WELL TO SELECT THE SANDS THEY WANT TO PRODUCE BY USING THE JOHNSTON FORMATION TESTER. THEY'RE ABLE TO SET CASING IN EXACTLY THE RIGHT SPOT, MAKING EACH STRING DO THE WORK OF SEVERAL, AND DEVELOP THEIR WELLS WITH FAR GREATER EFFICIENCY AND ACCURACY.

NO MATTER WHERE YOU DRILL, YOU CAN GET BETTER RESULTS AT LESS COST WITH THE JOHNSTON FORMATION TESTER TO GUIDE YOU. WRITE TODAY FOR JOHNSTON ENGINEERING BROCHURE 33-A, WHICH TELLS ALL THE IMPORTANT FACTS ABOUT THE JOHNSTON TESTER AND JOHNSTON TESTING METHODS. NO OBLIGATION AT ALL!

Johnston

FIVE DOLLARS ($5.00) WILL BE PAID FOR EACH INTERESTING OR UNUSUAL FACT CONCERNING THE PETROLEUM INDUSTRY (EITHER IN THE UNITED STATES OR ABROAD) WHICH IS USED IN THIS SERIES OF JOHNSTON ADVERTISEMENTS. SUBSTANTIAL PROOF MUST ACCOMPANY EACH CONTRIBUTION. WHEN TWO OR MORE SIMILAR FACTS ARE SENT IN, THE AWARD WILL BE GIVEN TO THE FIRST ONE RECEIVED ...

M. O. JOHNSTON Oil Field Service Corp.
3117 SAN FERNANDO ROAD — ALbany 0186
LOS ANGELES, CALIFORNIA
Bakersfield 2794 — Ventura 5621
"Servicing California and Selling Exclusively Foreign"

FORMATION AND CASING TESTING — JOHNSTON

JOHNSTON Oil Field Service Corp.
5702 NAVIGATION BLVD.
HOUSTON, TEXAS
"Servicing Mid-Continent and Gulf Coast"

"WHY SET CASING BEFORE YOU KNOW!"

Squeaks from the Bull Wheel

Just In

"Are you in town for good?"

"Well, I hate to commit myself."

Hospital Stuff

Why do you call that new nurse "Appendix?"

Because all the doctors want to take her out.

Go Decollete

"What color dress will you wear to the ball?"

"We's supposed to wear something to match our boy friend's hair, so I'll wear black. What will you wear?"

"I don't think I'll go. My boy friend's bald."

Arbitrated

A girl's greatest attraction is her hair.

No, I think it's her teeth. Stranger what do you think?

The same as you boys, but I don't lie about it!

Being Exact

A big scientist mentioned something about the Ozark Mountains being fifteen billion years old. Aunt Pudey spoke up and says: "I beg your pardon, Professor, the Ozark Mountains are fifteen billion and twenty-six years old."

The scientist was surprised that she could have such accurate knowledge and he says: "How do you arrive at those figures?"

Aunt Pudey says: "Well, it was twenty-six years ago when I was goin' to school that I read they were fifteen billion years old then."

Spring Is Here

A Kansas farmer stopped at the bank to see if he could arrange a loan on his farm.

"It might be arranged," said the banker. "I'll drive out with you and appraise it."

"You needn't bother," said the farmer, noticing a black dust cloud rolling up the road. "Here it comes now."

At 6 a.m.

"Young man, what do you mean by bringing my daughter in at this hour?"

Flaming Youth: "Well, I gotta be at work by 7."

Special Talent

"You were sent here, I believe, for writing a glowing prospectus for an oil company."

"Yes," said the prisoner; "I was a little too optimistic."

"Well," went on the warden, "the authorities want a report on conditions in this prison. I've decided to let you write it."

Gone

"Well since you don't want to marry me, perhaps you will return the ring?"

"If you must know your jeweler has already called for it."

According to the Record

"Who invented necking?"

"King Solomon. He took the Queen of Sheba into the banquet hall and fed her wine and nectar."

Realistic

"Do you think you can make a good portrait of my wife?"

"My friend, I can make it so lifelike you'll jump every time you see it."

All She Had

"Hae ye been oot wi' your lassie again?"

"Aye, dad, why do ye look sae worried?"

"I was just wonderin' what the evening cost?"

"No more than half a crown, dad."

"Aye? That was no sae much."

"It was a' she had."

Modern Learning

"How is Hennery gettin' along with school, Eph?"

"Not so well, Garge. They're learnin' him to spell taters with a 'p'."

Not Potent

"Hey, what's the idea," called the manager of a tavern to a Scotsman, "ordering a glass of water and then walking out?"

"What did ye expect me tae do?" replied the Scot, "stagger out?"

An Advance

"Dad's going to give us a check for a present!"

"Good! Then we'll have the wedding at noon instead of 2 o'clock!"

"But why, dear?"

"The banks close at 3!"

More Expensive

"My wife had a dream last night and thought she was married to a millionaire."

"You're lucky. My wife has dreams like that in the daytime."

Holding On

The conductor coming through the train saw the porter kneeling on the floor and cleaning a pair of shoes.

"Haven't I told you that you are not to clean the shoes in the aisle, but to take them to the washroom?"

"Yes, sir."

"Then why are you doing it?"

"Because the man in this berth is a Scotchman and he's hanging on to the laces."

Business First

Minister's Daughter: "Is your daddy going to heaven when he dies?"

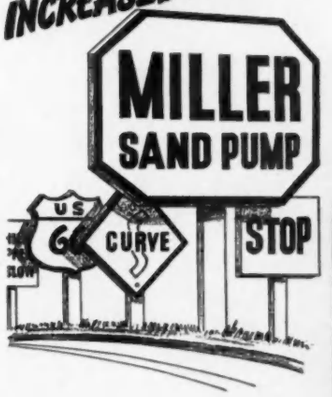
Realtor's Daughter: "Sure, he's going to subdivide it."

Outclassed

Preacher: "You must conquer yourself. I conquered myself when I was about your age."

Jones: "Well, you see, doctor, I'm a harder man to lick than you are."

Sign for INCREASED PRODUCTION



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The MILLER is made in diameters of 2½, 3, 3½, 4, 4¼, 5, 5½, 7 and 9 inches and lengths of 20, 25 and 30 feet. 5/32-inch wall thickness in REGULAR Type. ¼-inch wall tubes HEAVY DUTY Sand Pumps.

INTERCHANGEABLE BOTTOMS
To Meet Every Condition

● BAILER BOTTOM
With the Bailer Bottom installed the MILLER is quickly changed to a Bailer giving you a combination of either Bailer or a Sand Pump in one tool.

● SAND BOTTOM
Used when tools are run and when well is shot to quickly remove loose material.

● STAR BOTTOM
Used for cutting the sand loose.

● CHISEL BOTTOM
(In Pump)
With this bottom tightly packed sand can be easily broken in small pieces so it can be picked up in the pump.

Write for Descriptive Folder and Price List

See Pages 1672-73 COMPOSITE CATALOG

MILLER Sand Pump Co.

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FOR SALE BY SUPPLY STORES EVERYWHERE

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